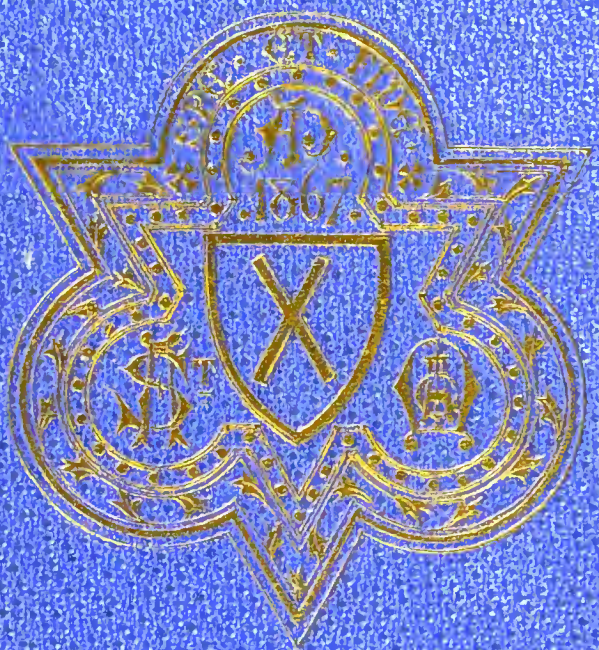
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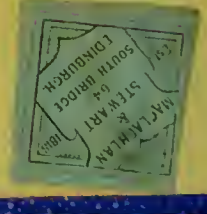

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St. Andrews Medical Graduates' Association.

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LAWS

OF THE

ST. ANDREWS MEDICAL GRADUATES' ASSOCIATION.

TITLE.

1.—The Association shall be called "The St. Andrews Medical Graduates' Association."

OBJECTS.

2.—The objects of the Association shall be the advancement of the Science and Art of Medicine, and of General Science and Literature, the maintenance of the interests of the Medical Graduates of the University, and the cultivation of social intercourse and good fellowship.

CONSTITUTION.

3.—The Association shall consist of Members, Honorary Members, and Associates.

4.—All Medical Graduates of the University of St. Andrews shall be eligible as Members, if recommended by two Members of the Association.

5.—All Members of the General Council, all Professors, and all non-medical Graduates of the University of St. Andrews, shall be eligible as Honorary Members, as well as such other learned and scientific men as may be recommended by the Council.

6.—All legally qualified Medical Practitioners shall be eligible for admission as Associates.

7.—Members, Honorary Members, and Associates, shall be admitted only at the General Sessions of the Association. The election shall be by ballot, and no one shall be declared elected unless two-thirds of the Members present vote in his favour.

8.—A Member, Honorary Member, or Associate, may withdraw from the Association by paying such subscriptions as may be due from him, and signifying his intention in writing to the President.

9.—No Member, Honorary Member, or Associate, shall be removed from the Association, for other cause than non-payment of Subscription, except in

accordance with the following regulations. A written notice of the proposed removal, signed by two Members of the Association, shall be sent to the Honorary Secretary, who shall immediately forward a copy of the charge to the Member accused, and shall at the same time summon the Council to meet within twenty-one days. He shall send a notice of the subject to be discussed to each Member of the Council at least fourteen days before the date of such meeting. If the Council shall resolve, by a majority of those present, that the Member so accused ought to be expelled, a notice shall be forthwith sent to each Member of the Association, making the next General Session special for the consideration of such removal, and if two-thirds of the Members voting shall be of opinion that the Member in question shall be expelled, the President shall direct the Honorary Secretary to remove his name from the list of Members. The votes shall be taken by ballot.

10.—The subscription constituting a Member or Associate shall be Five Shillings annually, due on the first of January in each year.

EXECUTIVE.

11.—The Officers of the Association shall be elected from the Members, and shall consist of a President, Six Vice-Presidents, a President of Council, a Treasurer, a Secretary, and a Council of Thirty-two; in whom the power of framing bye-laws, and of directing the affairs of the Association, shall be vested.

12.—Presidents of the Association shall, on retiring from office, become Honorary Members of Council.

13.—Five Members of the Council shall form a quorum.

14.—The Officers of the Association shall be elected by ballot at each Anniversary Session of the Association.

15.—The Officers of the Association shall be eligible for re-election, except that two of the Vice-Presidents and eight of the Council shall retire every year.

16.—The business of the President shall be to preside at the Sessions of the Association; in his absence one of the Vice-Presidents, the President of Council, or the Treasurer, or any Member of the Council chosen by the Members present, shall take the chair.

17.—The President of Council shall preside at the Meetings of the Council, and in his absence one of the Vice-Presidents, the Treasurer, or a Member of Council elected by the Council for that purpose.

18.—The Treasurer, or some person appointed by him, shall receive all moneys due to the Association.

19.—The money in the hands of the Treasurer, which shall not be immediately required for the uses of the Association, shall be vested in such speedily available securities as shall be approved of by the Council.

20.—The Council shall lay before the Members, at each Anniversary Session, a report of their proceedings during the past year, and also an account of the receipts and expenditure of the Association.

21.—The Council shall meet at least once in two months, unless by special resolution to the contrary.

22.—The annual accounts of the receipts and expenditure of the

Association shall be audited by a Committee of three Members selected at the preceding Anniversary Session from among the Members at large.

23.—The Secretary shall have the management of the general correspondence of the Association, and of such other business as may arise in carrying out its objects.

SESSIONS.

24.—The Association shall hold an Anniversary Session, commencing on St. Andrew's day, or on such other day as the Council may determine. The place of such Session, its duration, and the business to be transacted, shall be arranged by the Council.

25.—The Members and their friends shall hold an Anniversary Dinner on the last day of each Anniversary Session, at such place and time as the Council may determine; the President for the year shall be in the chair.

26.—No alteration in the Laws of the Association shall be made, except at a General Session. Notice of the alteration to be proposed must also have been laid before the Council at least a month previously.

27.—The Council shall have power to call a General Session of the Members at any time, and shall also be required to do so within one month, upon receiving a requisition in writing to that effect from not less than twenty Members of the Association.

28.—All Special General Sessions of the Association shall be held at such place as the Council may appoint.

GENERAL.

29.—The Council shall have power to publish the proceedings of the Association, and to make such charge for them as they may deem right.

30.—The Council shall have power to order the name of any Member whose subscription is two years in arrear to be removed from the list of Members.

NOTE.—*The Annual Subscription is ten shillings—five shillings to the Association and five shillings for the volume of Transactions—and is due on the first of January in each year. The well-doing of the Association depends largely on its prompt payment.*

CONTENTS.

Portrait of B. W. Richardson, M.A., M.D., F.R.C.P. Lond., F.R.S., President of the Council of the St. Andrews Medical Graduates' Association, Assessor of the General Council in the University Court of St. Andrews. Photograph by Barraud and Jerrard.

Transactions of the St. Andrews Medical Graduates' Association.

1871.

1871.

GENERAL SESSION,

MAIDENHEAD, JULY 7.

ANNIVERSARY SESSION,

LONDON, DECEMBER 1 AND 2.

St. Andrews Medical Graduates' Association.

GENERAL SESSION.

July 7, 1871.

The Session was held at the Orkney Arms Hotel, Maidenhead, on Friday, July 7th, 1871.

The President of the Association, Dr. Henry Day, Stafford, in the chair.

The minutes of the previous Session were read and confirmed.

Dr. Harris, Redruth, was elected a Member of the Association.

Mr. Hill, London; Mr. Bateley, Yarmouth; and Mr. Braye, St. Leonard's, were elected Associates.

In the evening the Members and their friends dined together.

ANNIVERSARY SESSION.

December 1 and 2, 1871.

The Fifth Anniversary Session of the Association was held at the Freemasons' Tavern, Great Queen Street, London, on Friday and Saturday, December 1st and 2nd.

December 1.

The Session commenced at 7 p.m.

The President of the Association took the chair.

The minutes of the previous Session were read and confirmed.

Dr. Fernie, Stone; Dr. Underhill, Great Bridge; Dr. Martin, Staff Assistant Surgeon Army; Dr. Mott, London; and Dr. Crawford, Stafford, were elected Members of the Association.

Mr. Broom, Sheffield, was elected an Associate.

Mr. Ruskin, Lord Rector Elect of the University of St. Andrews; Dr. Hammond, Philadelphia; Sir F. Pollock, Bart., London; Professor Huxley, London; and Mr. Hepworth Dixon, London, were elected Honorary Members.

The Officers and Council for 1872 were elected.

Dr. Davis, Putney; Dr. Watkins, London; and Dr. Woodman, London, were elected Auditors for 1872.

It was unanimously resolved, that the following alterations of Laws, recommended by the Council, be adopted:—

Law 9.—Line 2, after the words "the Association," to add, "for other cause than non-payment of subscription."

Law 14.—After the words "eight of the," to add, "ordinary Members of."

Law 15.—To omit the last paragraph, and to constitute it a new Law, beginning "The President of the Council shall preside at the Meetings of the Council, and in his absence," &c.

To insert the following new Law, after Law 4 :—

"Presidents of the Association shall on retiring from office become Honorary Members of Council."

To re-number the Laws.

The Report of the Treasurer was read.

The Report of the Council was read and received.

Dr. Coles of Croydon proposed, and Dr. Sheppard Fletcher of Manchester seconded,—

"That the Council be requested to take into consideration the difficulty Country Members experience in attending the Anniversary Session in the month of December, with a view of fixing a more convenient period for the year 1872."

Carried unanimously.

Dr. Swete read a paper on "Habitual Drunkenness and its Treatment, medical and legislative."

Dr. Griffith, Dr. B. W. Richardson, F.R.S., Dr. Shorthouse, Dr. Lush, M P., Mr. Hepworth Dixon, Dr. Seaton, Dr. Crisp, Dr. Ballard, and the President of the Association took part in the discussion which followed.

Dr. B. W. Richardson, F.R.S., proposed, and Mr. Hepworth Dixon seconded,—

"That the Council be requested to watch the progress of Dr. Dalrymple's Bill, and, at the proper time, to prepare an analysis of, and an opinion concerning the probable working of, the Bill ; and that the Council be empowered to communicate the same to a public meeting of the profession at large and of the public, if the proceeding be considered advantageous."

Carried unanimously.

December 2.

The President of the Association delivered the Anniversary Address, "The Historical Steps of Modern Medicine."

Sir Thomas Watson, Bart., proposed, and Dep.-Insp.-Gen. Gordon, C.B., seconded a vote of hearty thanks to Dr. Day for his admirable and important address.

The President in returning thanks announced that the Council, had in compliance with a resolution of the General Session of December,

1870, presented to Dr. B. W. Richardson, F.R.S., a Gown and Hood of the Doctor of Medicine of the University, in remembrance of his four years' tenure of office as President, and proposed a vote of thanks to Dr. Richardson for his great services rendered to the Association as President of the Council.

The proposal was carried by acclamation.

The Session was then closed.

ANNIVERSARY DINNER.

The Anniversary Dinner was held in the evening of December 2nd. The President of the Association, Dr. Day of Stafford, was in the chair. Sir F. Pollock, Bart., and Mr. Hepworth Dixon, honoured the Association with their presence as Guests.

Admiral Sir E. Belcher, K.C.B., and Dep.-Insp.-Gen. Gordon, C.B., returned thanks for "The Navy, the Army, and the Reserve Forces." Dr. Lush, M.P., returned thanks for "The Houses of Parliament." The President of the Association proposed "The University of St. Andrews, and the Assessor of the General Council." Dr. B. W. Richardson, F.R.S., returned thanks, and proposed "The Sister Universities." Sir F. Pollock, Bart., returned thanks, and proposed "The St. Andrews Medical Graduates' Association, and its President;" the President of the Association returned thanks. Dr. Cholmeley proposed "The Learned Professions;" Mr. Serjeant Robinson returned thanks. Dr. Cooper Rose proposed "The President Elect;" Dep.-Insp.-Gen. Gordon, C.B., returned thanks. Dr. Crisp proposed "Literature;" Mr. Hepworth Dixon returned thanks. Dr. Swete proposed "The Officers of the Association;" Dr. Seaton and Dr. Sedgwick returned thanks.

I

BUSINESS OF THE ASSOCIATION AND COMMUNICATIONS IN CONNECTION THEREWITH.

REPORT OF THE COUNCIL.

December 1, 1871.

The Council have great pleasure in meeting the Members of the St. Andrews Medical Graduates' Association at the Fifth Anniversary Session, and in submitting to them the Report of the past year's work.

During the year six Members, four Associates, and five Honorary Members have been elected; ten Members have died, twenty-one have resigned, and thirteen have been removed for non-payment of subscription; one Associate has been elected a Member, having obtained the degree of M.D. of St. Andrews, and four have been removed for non-payment of subscription; one Honorary Member has died.

The Association now numbers four hundred and sixty-seven Members, twenty-five Associates, and forty-four Honorary Members.

The losses by death which it is the painful duty of the Council to report are those of Dr. Tanner of London, Dr. Beverley Bogg of London, Dr. Ashforth of Market Overton, Dr. Henderson of Perth, Dr. Golder of Glasgow, Dr. Marston of Devizes, Dr. Coghlan of Notting Hill, Dr. Hubert of Billingshurst, Dr. E. Richardson of London, and Dr. Buckley of Rochdale, Members of the Association, and the Rev. J. B. Reade, M.A., of Bishopsbourne, an Honorary Member.

Your Council have had much pleasure in offering, at the request of the Association, to Dr. Richardson, F.R.S., a Gown and Hood of the Doctor of Medicine of St. Andrews in an appropriate oaken case, in recognition, albeit slight, of the eminent services which he has rendered to the Association; and they have received with much gratification, Dr. Richardson's consent to allow his portrait to be published in the Transactions.

Your Council were instructed by a resolution of the Anniversary Session of 1870, to consider the preparation of a law providing for the suspension of an existing law during a sitting if two-thirds of those present vote for such suspension. Your Council after careful

deliberation cannot recommend the passing of such a regulation, which, even when merely facilitating the mechanical transaction of the business of the Session, would in their opinion be open to grave objection in principle and possible abuse in practice.

A new law will be proposed with the approval of your Council, whereby Presidents of the Association will become, on retiring from office, Honorary Members of Council.

In compliance with the resolution of the Association at the last Anniversary Session, your Council have reconsidered the subject of Criminal Insanity with a view to the amendment of the law on the matter.

The Houses of Parliament were so occupied with other subjects during their last session that your Council did not deem it expedient to take any public action in the matter; but if, as seems to be probable, the ensuing session be devoted in large part to the consideration of social wants, your Council will use their best endeavours to bring this important matter before the notice of the Government.

In the meantime they offer for your consideration the following propositions which have approved themselves to your Council :—

1.—The parties to a cause must continue to have the power to call experts as witnesses.

2.—In all causes where experts are to be called as witnesses, the evidence they are to give, whether of fact or opinion, should be supplied to the opposite party in writing, before the trial.

3.—In all causes where medical evidence is to be given, and where there is a distinct divergence of opinion, means should be taken for obtaining skilled opinion by the Court.

4.—The last proposition may be put into practice in several ways :

a. By means of a Medical Assessor acting with the Judge.

b. By means of a fixed Commission, to whom matters in evidence may be referred by the Judge for their opinion.

c. By means of a Commission of two or more medical men appointed, as occasion requires, by the Judge, to report on the facts of the case and on the evidence submitted. The members of the commission to be subject to cross-examination.

5.—The mode of taking the evidence of experts should in all cases be uniform in respect to details.

6.—The present allowance for medical witnesses is utterly inadequate, and the scale of payment now in force should be revised.

The modified regulations for the Degree of Doctor of Medicine of the University of St. Andrews, which had on the proposal of the Assessor of the General Council been accepted by the University Court, and which had been sanctioned by the Chancellor of the University, have not received the consent of Her Majesty the Queen in Council, for the reason that no sufficient ground has been shown for any further extension of the privileges of the University. This matter has been so frequently before the Association, that your Council think it unnecessary to enter into any renewed argument, but content themselves with reporting that they have taken steps to ascertain the exact amount and nature of the injurious action of the present regulations on the profession and the public, in order that they may be able to lay before the authorities, not only a strong expression of opinion, but an exact record of the facts on which the argument in favour of the proposed change has been based.

This information your Council hope to obtain by a wide circulation of the following "Memorandum on Medical Degrees" amongst those Members of the Profession who are not at present Doctors of Medicine.

"The University of St. Andrews is the only British University "where a legally qualified medical practitioner can obtain, after "examination, the Degree of Doctor of Medicine without keeping "terms at a University or attending anew courses of lectures at a "Medical School; but candidates must be forty years of age, and "only ten such Degrees can be granted annually.

"The Scottish University Commissioners of 1858 reported that "the power possessed by the University of St. Andrews to grant, "after examination, the Degree of Doctor of Medicine to medical "practitioners, who after a successful career of some years are "desirous of obtaining a higher professional position, is proper "and advantageous if confined within due limits; and that, in "order to prevent any abuse of the privilege, they had required the "candidates to be forty years of age, and had limited the number "of Degrees which should be so conferred to ten annually, being "assured on the best professional authority that this number "would be quite sufficient to include all persons so situated who "could present any reasonable claim for admission to a Degree.

"The University has recently attempted to amend the regu-
" lations for the Degree of Doctor of Medicine by substituting for
" the provision that the candidate shall be forty years of age, one
" requiring him to have been in possession for five years of a
" medical or surgical qualification which would entitle him to be
" registered under the Medical Act, and by abolishing the limitation
" in the number of Degrees to be granted annually.

"The consent of Her Majesty the Queen in Council, which is
" needed to render any new regulation of this kind valid, has been
" refused, for the reason that no sufficient ground has been shown
" for any further extension of the privileges possessed by the
" University in granting Medical Degrees.

"This Association has contended that the Report of the Scottish
" University Commissioners as to the sufficiency of ten Degrees
" annually (which has doubtless influenced the decision of the
" Privy Council) is based on untrustworthy authority; that these
" arbitrary limitations as to the age and number of the Graduates
" exclude from the Degree many candidates who by their position
" and acquirements are entitled to offer themselves for examination;
" and that the true and only limit to the number of Degrees
" granted to already legally qualified medical practitioners of
" acknowledged respectability and position should be afforded by
" an extended and searching examination.

"Under these circumstances the Association is wishful to as-
" certain, as nearly as may be, the exact amount and nature of the
" injurious effect of the present regulations; and for this purpose
" it is endeavouring by means of the accompanying form, which it
" is hoped will be largely used and promptly returned, to collect
" the opinion of those most intimately concerned; the opinion, that
" is, of those legally qualified members of the profession who may,
" now or in a short time, desire to obtain the Degree of Doctor of
" Medicine.

"The Association, pressed by various and conflicting opinions
" and statements concerning the matter in hand, is only anxious to
" determine on absolute facts what is the true professional require-
" ment; it is not, therefore, intended to publish the names of those
" who are good enough to express in this manner their opinion on
" the subject, but merely to furnish the University Court, and, if
" necessary, the Privy Council, with accurate data."

The other Scottish Universities are empowered to grant, after

examination, the Degree of Master in Surgery, as well as that of Doctor of Medicine, and it has been represented that as the examination of the University of St. Andrews for the latter Degree includes Surgery, the University should have the power of granting the Degree of Master in Surgery as well as that of Doctor of Medicine. This matter will be brought before the University Court by the Assessor of the General Council, on a memorial from your Council.

B. W. Richardson, M.D., F.R.S., *President of Council.*
Leonard W. Sedgwick, M.D., *Hon. Sec.*

REPORT OF THE TREASURER.

The Account of Receipts and Expenditure for the year 1870 has been audited and found correct. An abstract is appended.

There is a balance against the Association of £22 9s. 5d., but as the deficit of 1869, amounting to £27 7s. 11d., has been paid off, the receipts have exceeded the real expenditure of the year by £4 18s. 6d.

J. H. Paul, M.D.,
Hon. Treasurer.

December 1, 1870.

Abstract of Accounts for 1870.

	£	s.	d.		£	s.	d.
Subscriptions of 1870	198	12	6	Deficit of 1869 paid off	27	7	11
Arrears paid up	18	7	6	Transactions and Postage	159	15	4
Payments in advance	5	0	0	Stationery & Stamps	16	18	9
Sale of Transactions	3	14	8	Sundry Printing	5	15	8
Donation from Prof. McDonald	5	0	0	Advertisements	0	16	6
Deficit	22	9	5	General Session, Windsor	4	12	8
				Anniversary Session and Dinner	17	16	6
				Assessor's Expenses	10	0	0
				Publisher's Charges	8	17	6
				Sundries	1	3	3
	£253	4	1		£253	4	1

Examined and found correct,

Saml. Hill, M.D.
Edwin Humby, M.D.
R. B. Painter, M.D.
} *Auditors.*

II

COMMUNICATIONS ON MEDICAL AND SCIENTIFIC SUBJECTS.

HISTORICAL STEPS OF MODERN MEDICINE.

THE ANNIVERSARY ADDRESS.

By Henry Day, M.D., F.R.C.P. Lond., President.

Fellow Graduates and Gentlemen,

If I were to commence this address with an affected indifference about, or without some direct reference to, those addresses, or rather those orations—for surely they deserve the latter title—which have annually rivetted your attention at each successive winter session for the past four years, I feel tolerably sure that some who are now present would tax me with being insensible to the many difficulties which beset the task I have undertaken, and to the marked inferiority you will be sure to recognise in my performance of a duty which, I think it must be admitted, the most able, the most eloquent of our Graduates might well be pardoned for commencing with feelings of anxiety, if not with feelings of absolute distrust.

Considering myself fortunate in being placed, by your kindness, in the position of President of our large Association, I nevertheless cannot divest myself of the feeling that I am not *so* fortunate in having to be the immediate successor of a gentleman whose many and great attainments, whose scientific fame and literary reputation, whose powers of oratory and poetry of language, must necessarily overshadow, and render dim by comparison, the feeble effort of one standing so low down on the ladder of medicine as myself; still, whatever my *fear* may be on this account, I do not purpose giving way to despair. I am not altogether without *hope*, and shall regard my condition as being illustrative of the presence of these two conflicting, but dominant, human feelings; whilst in my endeavour to regulate these, I

suppose I cannot do better than follow the example set by our greatest poet, (Milton,) who, when recording his sense of hopefulness, says,

"Where equal poise of Hope and Fear
"Doth arbitrate the event, my nature is
"That I incline to Hope rather than Fear,
"And gladly banish squint suspicion."

Whilst thinking, and doubting as to which and what amongst the various and varied themes of medical science would serve as an appropriate subject for the present address, I was bewildered alike by the extent of field from which to cull my material, and by the fact of that same field having had so many gleaners in it, as to leave but little to be gathered for an occasion like the present.

I could have much wished that some subject of original research should have formed my text, but, alas! such gifts as I have, do not lie in the direction of original research, or, if they do, they have been so neglected that now they are grown inactive, and thus this desire fled as it came.

I should have liked, the first thought failing, to have dwelt on some great episode in the past of physic; the analysis of some once favourite theory, or, perhaps, the depicting either of a great epoch, or of a great name in medicine; but unhappily, I live away from the centres of learning, where the literary treasures on which such an effort should be based are stored, and so, once more, the desire was stifled. At last I thought I might, perchance, beguile the hour by giving what seems, to one who lives outside the sphere of prevailing disputations, a simple sketch of the present realities of medical progress.

In every art and science of every age, there are two, if not three phases. There is what may be called the practical phase, pursued by the majority of those who have their interest in the matter, and presenting nothing more, and nothing less, than the current usefulness of the art or science to the masses. There is a second phase, which, expressed poetically, seems to signify some wave of advance, a wave rising high and mightily, and moving as if it would go outward to the sea, but which nevertheless recedes, collapses, is lost, is buried in its own time, and is at once forgotten. There is a third phase, which begins with a gentle ripple, but which increases as it goes on, until, at last, it flows into, and becomes part of, the distant ocean of truth, showing always where it came from,

leaving the evidence of its origin behind it, and making the time of its advent a distinct event.

In every age medicine has shown these phases; it shows them now; and the question that has occurred to my mind is, what examples of the last of these phases are, at the present time, recognisable amongst us? If we can define these we shall see, projected as it were into the future, the history which this age will leave behind it, and my effort will be to point out, in a limited manner, what I think will be likely to hold its place and form a part of history: hence the title of this address, *Historical Steps of Modern Medicine.*

In what I have to say under this head, I shall try to skip detail, and keep solely to the idea suggested by the largest courses of advancement; I shall, in like manner, avoid feeble theory, and keep solely to the strongest principles in advance. I shall not leave anything unnoticed *because* it is not yet very prominent, and I shall not, I hope, be drawn into recognising things that are prominent *only* because they are popular and plausible. I shall try simply to represent what, as a steady reader, I have "read, marked, learned, and inwardly digested."

The first foundation in medicine belonging strictly to our own age is *Natural Histology.* Perhaps it is scarcely fair to say it belongs primitively to our age, for Clapton Havers, Meade, Leuenhoeck, the Monros, and many others, were, in a sense, histologists, and some of Monro's plates, forgotten now-a-days, are truly wonderful for their time. But, after all, the progress made was uncertain and irregular, and was too individually isolated to pass into strict science, nor did it lead up to any generalisation, that could be considered a step, until Schwann developed the conception, to use the words of his translator, "that one common principle of development forms the basis for every separate elementary particle of all organised bodies, just as all crystals, notwithstanding the diversity of their figure, are formed according to similar laws." On the foundation of this general principle we have, in the last thirty-five years, accumulated for our successors a series of basic truths, without which, however much their means of instrumental research may improve, they could make no new work, they could found no new principle. I may go even a little further than this, and bestow praise, where it is most worthily due, on those ingenious mechanicians

who—standing side by side with us, or following us, or, mayhap, anticipating our wants—have brought the science of minute optics to such perfection, that a long time must elapse before any further great advance in the perfection of the instrument, or in results attainable by such perfection, can be accomplished.

It is impossible, at this moment, to recount any special or detailed feature of histology; it will be better, therefore, to speak of it in its general sense as the newly discovered anatomy of this age: of an anatomy as important, as comprehensive, as that general anatomy which, through the labour of centuries, has descended to us as the basis of our art. For, in brief, as our forefathers were taught, by the general structure and shape of parts,—that is, the parts as they appeared to the *unaided* vision,—to say this is bone, this is muscle, this is blood, this is nerve; so we, by the new anatomy, and with, as it were, a new sense, are able to say from what, to our predecessors, was invisible matter, this is bone, this is muscle, this is blood, this is nerve, and the like. Again, as they were able to preserve and fix their skeletons, and other structures, by which to teach the student, so we are able to preserve and fix our minute tissues, putting a whole museum into a single cabinet for the instruction of those who learn from us. The advance is so great, that a discovery in chemistry which would render the molecules of elements, and molecular construction visible, would only equal it. It is, I think, a firm historical step in modern medicine.

If what I call natural histology be an advance, morbid histology, or, perhaps, more correctly speaking, the histology of morbid tissues, must be placed on a line very little below it. Here again we start a new science running after, and supplementing the older morbid anatomy. Thus, as the older physicians took up a part and said, this is hypertrophied, this is atrophied, this is vascular, this is discoloured, this is too red, too pale, too dark, too light, too heavy, too fluid, or too solid; so we, taking the same parts, speak of them by the minute visible changes they have undergone.

It may be urged, and I believe with some truthfulness, that the fascination of this last named study has held back research in other studies equally, if not more directly, practical; but, after all the error, should it be one, is merely temporary, and the labour represented in it is really so much capital faithfully banked, and ready to be drawn upon when it is required. What, indeed, is now most wanted, is the application of one or two consummate scholars in histology to condense, arrange, and simplify, all that has been

ascertained: this effected, the science of histology of morbid structure would stand as a certain historical step raised by the hands of modern physic.

In parenthesis, as I leave this topic, let me, in a plain practical way, make this further suggestion, namely: that, as in our schools we establish museums in which the student can, at his leisure, compare natural parts and organs with the same organs in a diseased condition, so every school should supply to the student a miniature museum of natural and morbid histological specimens, the whole being so systematically arranged as to show readily the divergence of structure from a natural standard, and to be read off as easily, and as definitely, as from the pages of a book.

There is another advance, having its origin in our time, to which the name of *Animal Dialysis* is applied. It starts from the labours of Dutrochet, and his early observations respecting the passage of fluids through membranes—the lighter, as he thought, into the denser fluid. Year by year this advance has changed and progressed, adding new names to our scientific literature, such as, Exosmosis, Endosmosis, Osmosis. For awhile it dealt only with gravities of liquids, and included the mere idea of motion by attraction of mass in fluids. As it became more studied, it grew in proportion, and took new shape, until, in the hands of Graham, it glided into the contemplation of diffusion, and became connected generally, but not minutely, with the laws of diffusion of other states of matter. At length, and still in the hands of the same illustrious master, the study suggested the grand separation of organic structures and substances into the two divisions of Crystalloids and Colloids—the salts representing the former, the gelatinous and albuminous matters, and their analogues, representing the latter. Still progressing, the relations of water, the neutral steady component of active organic matter, came into consideration in connection with the crystalloidal and colloidal states, and thereupon occurred the discovery that while the colloids pick up water abundantly, the crystalloids fix it, and become carriers of it. And yet a little further, and the transition of similar matter (in heterogeneous combination) from the crystalloidal to the colloidal state, or the reverse, became evident.

The field opened up by these researches is simply as remarkable as it is new: the facts that have been revealed reach from the

beginning to the end of part of the phenomena of every living organism. The study of the germ in the ovum suggests at once the thought of dialysis, the study of secretion in glands suggests the same, the study of vascular distribution and of nutrition by blood suggests the same, the consolidation of muscular fibre suggests the same, and so universal is the study, that whenever, in dissection, we come upon membrane, or membranous structure, however web-like or refined, we are brought to dialysis.

I know this development of medicine to be, as yet, in its first stage. I know that if I had the ability to say more about it I should require fresh research to make my observations of interest to those who are listening to me, but I was bound not to let the subject pass without characterising it as a third step in modern medicine, rough, and only partly hewn, but *certain* to remain.

In the past days of our literature we have entertained an endless variety of plans for naming and classifying diseases, with the result of a confusion that is lamentable. This has arisen mainly from the methods that have been taken of studying diseases apart from their causes. The earliest of our philosophers, including all who may be called Hippocratic, were accustomed, in a childish way, to look at each disease, almost exclusively, in relation to its *presumed* cause, paying but little attention to the inner changes that were in progress in the body during the existence of diseased manifestations. In more recent periods, after anatomy began to exist as the root of medicine, and the study of natural structures and functions were engrafted upon it, the tendency manifested itself of making the science of disease a lesson derived from the examination of unnatural conditions of organs and parts. By this plan, the art of naming diseases became separated from the question of cause ; hence, we have long classified all our diseases by what we have discovered in the way of departure from natural conditions, asking no word in reference to source, and enquiring very little respecting the phase, or stage of change from a natural state, which the changed structure exemplifies.

Take an example : the anatomists, observing certain changes in the liver, different from natural conditions, have given to one change of disease the name of Cirrhosis. The change established, speculation next follows as to the cause, and slowly it comes out, by evolution, that alcohol is the cause. Or they discover another

change of organ—say waxy kidney—and on goes speculation again, by evolution, to trace the cause, but, up to this time, without any satisfactory result; and so I might proceed, naming diseases from their mere structural changes by the dozen, and leaving their causes altogether in obscurity.

A return to the Hippocratic method of study would reverse all this, and by one sweep of test, or experiment, would bring into classes all morbid changes that spring from common causes: it would teach us, for instance, with regard to alcohol, to determine by extended and definite experiment, every morbid structural change belonging to the influence of alcohol, and so, step by step, it would lead us on from cause to the minutiæ of its effects, until our nomenclature, now expanding and expanding by the addition of every discovered change, (and so admitting of being infinitely varied, in detail, without affecting a single postulate,) would be contracted and contracted until it was brought to as few postulates as there are causes.

In the midst of much that is unsatisfactory in this department of medicine, there is still much hope: hope brightening day by day in respect to our progress, and resting, in a certain sense, on a return to that original method of tracing disease from its first cause, to which reference has been already made. The return alluded to is not being carried out, I know, on the original plan, but the end sought after is the same, and there is this advantage in the method at present adopted, that, although it is new, it does not interfere with the old, but runs, coupled as it were, with the ancient usage of observation, and blends well with it. This new method is called, *The Study of Disease by Synthesis.*

By ancient usage, the disease was, in every case, accepted as though it were, if I may say so, an experiment projected, by nature, out of the knowledge of the physician, but sought after, as to its cause, by an examination of the external conditions under which it occurred.

By modern usage, the experiment of disease is made by the observer; the *synthesis* of disease, as it is said, is practised, and, from a given known cause, suggested by theory, morbid changes are produced, which changes resemble those that take place under what have been before considered as the hidden workings of nature.

Of the results of these synthetical researches the world at large has no knowledge, and the profession, taking it as a body throughout the world, but little knowledge; and indeed, the study of disease

by synthesis has been cultivated for so few years there is small reason to wonder it should be so little, so indifferently recognised. There is as yet about it hardly sufficient information to produce a decent volume, and yet how rapidly has it led us toward generalisations in all the directions in which it has been applied.

That Diabetes should be producible, synthetically, by the process of irritating the floor of the fourth ventricle, by the inhalation of carbonic oxide, and by other agencies affecting the nervous centres, thereby proving the true neurotic origin of this formidable malady, is one of those rapid strides by direct experiment which could not be accredited had it not actually been done, and which, instead of running counter to the previously recognised, but obscurely understood morbid states of the ailment, runs with them, and explains them, as they were never explained before.

That the disease so long known as Cataract should be synthetically producible by the simple process of charging the circulatory current with an excess of crystalloidal matter; that different forms of cataract should positively be producible by the action of different crystalloids; that the well known diabetic cataract should be producible by the mere introduction of glucose, the crystalloid which the diabetic patient is throwing off, and that, by placing the body of the animal, in which the morbid state has been generated, in favourable circumstances for recovery, recovery should follow;—that all this should happen, opens up to us a series of truths so startling that one almost hesitates to accept them in full, lest, by some accident of experiment, an error should have been committed.

That Epilepsy, and the chronic Epileptic condition, should be producible by the division, and removal of portions of nerves; that the epileptic seizure, in the prepared animals, should at once be made evident by the disturbance of motion in the peripheral nervous matter, at some given point of the surface of the skin; and that the tendency to the produced disease should be transmitted by hereditary descent,—these again are facts so extraordinary that we feel we have yet to wait for a knowledge of the true meaning of nervous lesions; for a knowledge which does not now exist, that is to say, for the discovery of lesions which are not detectable by our present instruments of research,—our chemical tests, our microscopes,—refined as these may be.

That all the conditions of disease once known by the name of Apoplexy, or Apoplectic Convulsion, but now called Uræmia, should be producible by the process of dividing the nerves of the kidney;

by separating the vessels of the kidney from the organ; by introducing the nitrogenous product of the kidney—urea—in excess into an animal; or lastly, and most wonderfully of all, by making the nitrogenous substance from inorganic materials out of the body, and then occasioning the disease by its introduction into the body,—these are facts certainly not less strange, not less remarkable, than those which have preceded.

Let me wait a moment,—Is not this last series of facts, in one particular, the strangest and strongest of all? Is not the production of uræmic poisoning by an organic substance *artificially produced*, the first illustration in science of synthetical organic poisoning by a derivative obtainable from the inorganic world?

"Take," says Boerhaave, lecturing in the year 1735, "some very fresh well concocted urine of persons in perfect health, put it presently into a very clean vessel, and with an equable heat of two hundred degrees, evaporate it till you have reduced it to the consistence of fresh cream, and whilst it continues thus hot strain it through a bag, that the tenacious oil may in some measure be retained there, and separated from it; and the more accurately this is done the better. Put a large quantity of this thick inspissated liquor into a tall cylindrical glass vessel, with a paper tied over it, and let it stand quiet in a cool place for the space of a year. By this means, then, you will have a solid, hard, sub-pellucid, brown, saline mass, fixed all about the bottom of the vessel; and over this a thick, black, pinguious liquid, separated and rejected as it were from the concreted salt. Decant this liquor, take out the saline mass, put it into another vessel, pour some very cold water upon it, and shake it about to free it from its oily impurities, which may be done pretty easily, as it will not easily dissolve in cold water. Keep this saline matter under its proper title. If this is dissolved in hot water and strained till the *lixivium* becomes exceedingly limpid, and evaporated to a pellicle in a clean glass vessel, then, if you set it by in a cold place, it will shoot into saline glebes of a particular kind, that are perfectly distinct from every other salt. In their figure and solidity, however, they come pretty near to the crystals of sugar. These are not fœtid, nor alcaline, but very volatile. This is the native salt of urine."

How little thought Boerhaave when, for the first time, he thus described the native salt of urine, how little thought he the day would come when we should separate the same salt from the urine in a few hours, manufacture it in the laboratory if we wish

so to do, and produce with it symptoms of disease, which he, at the bed side, had often seen, but dreamed not of as resulting from the action of the native salt that first came through his scientific hand from one of the recesses of nature. Perchance, even now, there are many things as familiar to us, as the native salt of urine was to Boerhaave, producing diseases as definite as uræmia, and altogether unknown to us as factors of the phenomena we define, describe, converse about, treat, and try to cure.

To turn to other discoveries by synthesis:—That, by division of the sympathetic nerve, we should be enabled to produce paralysis of blood vessels, and that, under the paralysis, so produced, we should witness suffusion of blood, rapid radiation of heat from the extended vascular service, exudation and other secondary symptoms, and indeed all those primary effects of heat, pain, redness, and swelling, which the ancients called inflammation,—these are amongst other striking results of modern experiment.

That, by a division of the supply going to a secreting gland, there should be increased flow of secretion, and further, in relation to another system of nerves, (cerebro-spinal nerves,) that there should be, on their division, ulceration of the parts they supply, as in the case of the cornea, followed by cure of the ulceration, upon division of the sympathetic supply to the same part, is an equally great progress.

That division of the sympathetic nervous supply of parts and organs should tend to the results I have named, establishes a synthesis as remarkable as it is practical; but, I think, it is eclipsed by the more recently discovered fact, that similar phenomena may be produced *without* division of the sympathetic, viz.: by the impression made on the nervous organism by the vapours of the organic nitrites, especially the amyl-nitrite, the first of the series subjected to physiological study. Let me dwell here a moment in explanation.

The organic nitrites, it has been shown, seem to act almost instantaneously on the nervous system of organic life, reducing the power of that system, and reducing, as a further result, the tension of vessels; thus they cause relaxation of extreme vessels, and lead to almost instant suffusion of vascular surfaces, so that, after inhaling the nitrite of amyl, the face becomes suffused with the deepest crimson blush; thus also they cause intense action of the heart, followed, if their administration be long continued, by paralysis of that organ, by syncope and death; thus also they excite secretion—that is to

say, owing to the relaxation of vessels which they produce in the vascular system of the secreting organs, (for instance the kidneys,) they permit an excessive secretion to take place.

Further, and still more singularly, the nitrites produce a series of phenomena identical with well known emotional states, and, in their extreme action, we even recognise the same condition that we perceive in extreme states of perverted emotion, such, emphatically, as we see in hysteria.

Thus the study of these organic bodies has yielded the most fruitful synthetical results: it has shown that the inhalation of what might seem an almost inappreciable quantity of an organic body will paralyse the ultimate muscular system, set free the heart to renewed action, loosen secretion, disturb cerebral function, and relax muscle to the extremest degree,—in a word, induce all those conditions of disease which lead to what we are accustomed to call "collapse."

That the inhalation of "ozone" should produce catarrh, and, carried to any great length, should lead to pulmonary congestion, and even pneumonia, is another illustration of synthetical work, interesting, if in no other respect, in this, that it shows the direct action of some common and widely spread natural agents, to which we are day by day subjected, upon the peripheral nervous surface.

That the inhalation of dry oxygen at a high temperature, should produce separation of the fibrine of the blood within the bodies of the carnivora, is, once more, a synthetic fact of modern development, throwing great light on the changes which occur in blood during periods, and conditions, when the temperature of that fluid is preternaturally high. How it correlates with the fact, that an increment of twelve degrees of heat in an animal leads to rigidity of muscle, coagulation of fibrine, and rapid death, (another line of synthesis, bearing on febrile conditions I had almost said,) I need not wait to tell, though I could not very well omit the allusion.

That the laborious researches of medical helminthologists should have shown to us how by the administration of an entozootic organism to a living animal, a new development should follow: that Cysticercus from one animal should pass into Tænia in another, and Tænia from one animal into Cœnurus in another; that these things should happen, and be made so plain as to come under the positive rule of science, is a scarcely less encouraging advance than any of the other advances to which I have ventured to direct your attention.

Lastly, before I leave the synthetieal method, I must refer to the synthesis of Endocarditis by the introduction of an organic acid (lactic) into the eirculation of a healthy animal. It was originally thought that thus experimental research illustrated the cause of aeute rheumatie affections; it was never claimed to do so by its author, and later enquiry has unquestionably, I think, put the origin of rheumatism back to a point of time preceding the formation of abnormal acid products, and has shown that such produets are seeondary, that is to say, are the results of the pre-existing systemic derangement.

I have endeavcured to show, in another place, that acute rheumatism is a true neurotie disorder, having its origin in a morbid impression made on the peripheral cutaneous nervous expanse, which, refleeted to the cord, leads to all the subsequent symptoms, ineluding the formation of abnormal products. Continued observations support this view, and none better than a fact I have lately ascertained, namely, that between twenty and thirty athletic men were rendered subjeet to acute rheumatism by being exposed to eold and frietion, applied to the surface of their bodies.

The laetie acid synthesis of acute rheumatism must then, in my opinion, be set aside, but not so in regard to that sequel of rheumatism, endocardial inflammation: on this point the synthesis established has been so eertain, that the endocardial murmurs have been produced, the inflammatory states of the membrane have been traeed through all their stages, and the ehronic effects followed out to the end. Thus we are left by the means of a synthesis, as beautiful as any of the before-mentioned examples, with the information that a product of the primary derangement, called Rheumatism, may, by a known means, excite the seeondary derangement, ealled Endoearditis.

In the present era many advances have been made in the methods of diagnosis, and although no single method can be considered great, in eomparison I mean with sueh a grand diseovery as auscultation, yet, in the eombination of several methods, we have a sum total of advaneement that will probably look well in the next page and stage of history.

The first and most important of these means in the *Thermometrical;* the applieation of the thermometer to the detection of some

obscure forms of disease: but the usefulness of this instrument does not stop here, for, whilst diagnosis is the means by which we are able to arrive at our prognosis, the thermometer is of immense service in guiding us in respect to prognosis. To me this point has been matter of study for several years, and I know of no enquiry that has afforded more positive answerings. Is one in doubt as to the premonitory stage of tubercle? does physical examination by the stethoscope give an equivocal reply?—there is the thermometer by which to solve the difficulty. Does one, after a case of "shock," or "surgical operation," wish to know the earliest indication of real danger?—there is the thermometer to tell us that the danger is imminent, or even that it must be fatal. Do we meet with deceptive symptoms of fever?—again the thermometer is our guide.

A man is brought into the General Infirmary at Stafford to be under my care, and there have been periods when he seemed so well, before I saw him, that he was considered to be in no kind of danger; but then I find, on enquiry, that there have been other periods of his illness when there has been what is called "high fever," followed by intense depression. A case, you may say, of relapsing fever. Yes! I learn that on two occasions he has had an elevation of temperature during the day up to $105\frac{2}{5}$ Fahr.; on another occasion, he had a second rise of temperature on the same day, and the mercury then stood at $107\frac{1}{5}$ Fahr. On the thirty-third day of his illness, the morning temperature was 96; rising to $103\frac{1}{5}$ at two p.m.; and falling again at five p.m. to 100; at eleven p.m. the thermometer marked 106: and altogether the instrument gave a series of such ugly variations that my experience told me I must augur the worst, as there is, as yet, no known remedy with which cases showing these extreme variations of temperature can be met. Unhappily, the thermometer told but too truly, for the man died.

Take another case—a young woman is brought into the same institution labouring under well marked enteric fever, with a morning temperature *persistently* higher than the evening temperature: again my experience bids me pronounce unfavourably as to the termination of the case, and again the truthful thermometer is correct—the poor patient dies.

I could multiply and multiply these experiences of the uses of the thermometer in disease, but the labour is unnecessary, for they are your experiences as well as mine.

I am fully prepared to admit that an undue importance has been given to the *Laryngoscope*, not to it as an aid to a particular diagnosis, but as a general sign of advance in scientific medicine. I am not, therefore, going to extol this instrument as if it were an instauration, or, indeed, anything more than a clever use of a reflector—an extension of a practice that has long been known to, and carried on by, the dentists, as well as in various kinds of physical experiments. On the contrary, I can but feel that medicine everywhere showed an unnecessary weakness in the appreciation of first principles of advancement, when she lent herself, so urgently and wonderingly, as she did a few years ago, to anything so essentially small. At the same time, to be quite fair, the diagnosis brought out by the laryngoscope has served some useful purposes. For the discovery of foreign substances lodged in the upper part of the air passages, for the detection of morbid growths in the same parts, of morbid conditions of the vocal cords, and of ulceration of the glottis, the laryngoscope supplies us with an instrument which, now that we have it, we could not conveniently spare.

The *Ophthalmoscope*, really an instrument of our own time, stands in a much higher rank of discovery as a means of diagnosis. The instrument, simple as it is, is, I mean, the product of a higher physical induction, and the results of its employment lead to a deeper insight into internal changes of structure. The ophthalmoscope pierces beyond the retina, though it illuminates that nervous expansion only, for, by inferential teaching, it reveals to us the inner vascular changes, and changes of nervous matter in the cerebral centres themselves. Briefly, this instrument, commenced for the special purpose of enabling the ophthalmic surgeon to recognise the structural diseases within the globe of the eye, has become now of so wide an application in the hands of the general physician, that it promises to rank, as an instrument, next only to the stethoscope in physical diagnosis.

Just as an illustrative case I may mention the following. A man was admitted as an in-patient at the Stafford Infirmary under my care: he complained of continued, and sometimes very severe, pain at the left side of his head. His general health appeared good. He had had syphilis. For many months he had been treated for neuralgia (tic), and had swallowed no inconsiderable amount of iron and quinine. An ophthalmoscopic examination of the

left eye showed white optic atrophy, with considerable cupping of the disc; vision was very imperfect, although, strangely enough, he was not aware of this until the examination was being made. The diagnosis arrived at was tumour in the left side of the brain, probably in the neighbourhood of the optic tract. After being in the Infirmary nearly three months, the sight of the left eye having been quite lost, he died in a fit whilst in bed. The post-mortem examination revealed a gummy tumour completely obliterating the left middle cerebral artery, accompanied with softening of the *entire* left cerebral hemisphere. Thus much for the ophthalmoscope.

An instrument of our time, now very much neglected, except at quiet corners of great metropolitan thoroughfares, where it may be tried for a penny, is the *Spirometer*, invented by the late Dr. Hutchinson. This instrument, as a measurer of vital capacity, and as a by no means indifferent measurer of vital power, has passed, I think, into disuse without deserving the neglect. It is a good instrument; too clumsy, I doubt not, in construction, and, in this respect, unpopular, but most valuable when correctly employed. Like the thermometer it is a most important aid in the discovery of tubercle in doubtful cases. It affords the most telling record of the amount of pulmonary damage in cases of emphysema, and it has developed some singular physiological facts which have yet to be properly worked out: one specially; that capacity of respiration is greater in tall than it is in short persons, although, in the latter, the circumference of the chest may be relatively larger.

The *Sphygmograph*, introduced amongst us in recent years, has yielded readings infinitely curious, if not, as yet, peculiarly practical. Its application, generally, is limited by its complexity, and, if I may be so bold as to say it, it gives us what we do not always want, and it does not give us what we always do want. If it could be simplified in construction, and could be so arranged that it would register for us the precise number of strokes of the pulse per quarter minute, together with the exact power, or force, of the pulse, so that from visit to visit we could be accurately taught on these two points, we should have an aid of great value. But it may be, that, as it is, some leading discoveries have to be made with it for the benefit of the working practitioner. For these we must wait.

Electricity, as an aid to diagnosis, is one of the latter day improvements to which I need to direct attention. The use of the minor telegraphic arrangement for the detection of metallic sub-

stances in gun-shot wounds; the use of the metallic brush and dry conductor for testing degrees of sensibility of the surface of the body; of the interrupted current for proving the continuance of muscular contractility; the employment of moist conductors for determining the relative failure of particular muscles in paralysis, —these are advances, simple, but ready to hand, and often satisfactory in the lessons they teach.

Lastly, there is the most recent improvement in the art of diagnosis, the application of *Ether Spray* for testing the vascular tension of parts of the body, or of the body as a whole. We try by this method, what resistance the nervous surface can offer to an extreme degree of cold suddenly applied, and we find in proportion to the feebleness of resistance the rapidity of the action of the cold as shown by freezing of the part. It has in this way been shown in a case of paralysis, that, whereas in the healthy parts of the subject a resistance of nine seconds was offered, in the paralysed parts the resistance was overcome in two seconds. Here we have a new instrument of diagnosis; so new that we all have to learn its utility.

These aids are all historical steps in our medicine of to-day; they are little steps, but distinct, and, unless they become overshadowed by some new and grand generalisation in diagnosis, will stand out demanding recognition and receiving continued improvement.

They are faithful indices of the age altogether, of an age weak in grandeur of conception of natural things, but strong by, and through, its mastery of many minor ingenious contrivances, which massed together bespeak power as

> "Sands make the mountains,
> "Moments make the years,
> "And trifles, Life."

Every epoch in physic is marked by some great achievement in surgery: for surgical art is so purely experimental, and progresses so steadily from one point of venture to another more daring point, that it must move on independently of theory, or even of physiological discovery. Thus, one age introduces the ligature for bleeding vessels, another introduces transfusion of blood, another the process of cutting for cataract, another the tying an artery for aneurism, and so on. As a rule, a single age, nay a century, has developed

but one grand surgical advance, one historical step in surgery; our age in this respect has been much more favoured.

In our time we have had unfolded to us the whole art, the whole practice, of *Subcutaneous Surgical Operation*, the same culminating, at last, in the subcutaneous division of the neck of the femur. It would be difficult to over-estimate this branch of progress, about which no fault hangs, greater than its artificial and needless separation from general surgery, a separation happily not likely to last long: it is one of the most positive improvements in a mere mechanical point of view, and it is an improvement which teaches beyond its own immediate sphere.

I remember once that at a medical meeting at Chester, when a debate on pyæmia, and other sequences and consequences of surgical operations, was going on, I asked the members of that large meeting whether any one of them had ever heard of pyæmia following upon a subcutaneous operation? The answer, on every side, was an emphatic "*No.*" I observe, moreover, lately that the same negative position is steadfastly maintained. In this truth alone, how instructive a lesson lies open to view, I need not say; and I could cull other lessons from the same source; but I must pursue a new path.

The operation of *Excision of Joints* is a surgical feature of our time. That it met, at first, with much opposition from those who take the lead in the surgical art, is but what ought to be expected of men, who, holding in trust that which has been proved to be good, are jealous about resigning such trust until something better is demonstrated. In the case of excision, the balance of opinion is in favour of the operation, and of certain simplifications of it which promise well: I refer particularly to the simplification which consists in merely cutting down upon the diseased bone by free incisions, and in permitting exfoliation of dead osseous structure, and healing by granulation.

The operation of *Iridectomy*, devised by one of the finest surgeons this century has produced and lost, may be considered a true advance in surgery, accomplishing for the subject of glaucoma that which extraction, or depression of the lens, has done for the subject of cataract. I am reminded that in saying *so* much, I may be saying *too* much for iridectomy; for I am aware that while all are agreed in favour of the operation for cataract, there are some who are not agreed in favour of the other operation—who do not see the principle by which it effects good, and who, indeed, do not even

admit the good it is assumed to effect. But after all, from the evidence on both sides, no impartial looker-on can, I imagine, doubt that the verdict is in favour of the operation, and, if such be the fact, the proceeding, even if it should prove but partly true, will rank as being memorable of our time.

The operation for the *Cure of Recto-Vaginal Fistula*, and of *Perineal Rupture*, is an achievement worthy of distinct historical notice. It has required none of the elements of genius to promote it, it falls back for this element on him whom Butler eulogises—

> " So learned Tagliacozzius from
> " The brawny part of porter's bum,
> " Cut supplemental noses which
> " Would last as long as parent breech ;
> " But when the race of Nock was out,
> " Off dropt the sympathetic snout."

But still it has brought out so many points of surgical skill, neatness, perseverance, and last of all, *success*, that it ranks but little under a work of genius. Most encouragingly it has saved many of the weaker part of humanity from long leases of severe and unremitting pain, and has offered a radical cure for an accident which so long as women bring forth children, will, in a certain per cent., be sure to attend that vital process.

Together with this plastic method we may consider, as kindred to it, the method of *Skin-Grafting ;* another modification of the instauration of Gaspard Tagliacozzius. In this matter of skin-grafting there has not yet been sufficient time for observation to allow of a definite answer as to its value, and so I leave it *sub judice*.

The *Treatment of Aneurism by Compression* of the vessel supplying the aneurism, above the tumour, while it fails to be great because, after all, it is but an alteration of Hunter's invention of tying the vessel, marks, nevertheless, an improvement in mechanical art ; and, when it can be well carried out, signifies an endeavour to save the patient from the danger that always attends the laying open, by the knife, of the living tissues. It confers credit, therefore, if not lustre, on our age.

The revival of the old system of *Treating Wounds by Excluding the Wounded Surface from the Air*, and by employing, as a dressing, some preserving or antiseptic substance, has been a very useful step, but a step hewn, or attempted to be hewn, with little regard to scientific

precision. The plummet and the square, to speak figuratively, have been sadly ignored, while the surface of shirt-sleeve exhibited by our workmen has shown that in the work there has been sufficient *will*, with insufficient superintendence: the ambition spiritual, the reward dust. The result has been, and naturally so, a Babel, breaking up now in perfect confusion, with the workers so unintelligible to each other, that even those who call out a simple word such as "germs," are not understood by others who call out the selfsame term. I have a sort of notion, however, a step will yet be made in this age which will do credit to our knowledge of treating wounds; that some clear mind will come ultimately to clinch the work and reduce to order what is now wantonly irregular: I name the subject therefore as being, like some others, one of hope, rather than the realisation of a fact accomplished and bequeathed to those who may follow us.

As, for a postcript, the lover cherishes his choicest words of admiration or trust, so, under the section of surgery I retain to the last a reference to the prime surgical work of this era: I mean the advance made in the introduction of *Ovariotomy* as a surgical cure. That out of a hundred women, who thirty years ago would have died had they suffered from the disease known as ovarian dropsy, seventy should now be saveable by the interposition of the art of the surgeon, is a triumph unmistakably grand. Let us assume that the operation shall not last!—let us assume that in the progress of physiological science, some simpler cure than that of laying open the abdominal cavity and removing the ovarian cyst, and firing the pedicle of the cyst, shall be discovered! —that discovery itself will not conceal the greatness of the operation I name. For, to prove, as it has proved, how the viscera of the abdomen may, *in extremis*, be exposed and explored, is, in itself, sufficient event to fix the attention of the after ages. Meantime too, while we wait for new light, we have the practical results of the operation for our *own* satisfaction, and for our warrant to the wiser men, the magisters of the future, that the intrepid skill of our surgeons, who perfected this operation, was guided by the steadiest principles of art. It is to all of us, their fellow-workers, an honour, to them a pure, an enduring fame.

Let me, herewith, pass from the field of surgery of our time. The workers in it have left two relics at least—namely,

subcutaneous incision and ovariotomy—that shall be long remembered, and shall wear enduringly, as historical steps of modern physic.

One other subject relating to the work of our time has yet to be considered. It is the greatest work of all, the most universal in its application, the most difficult in its advancement, the most useful in its perfection. You will anticipate me in thought 'ere I name this work as the science of *Therapeutics*. Such scope is there for observation in this field, I am embarrassed with the richness of the prospect.

The old methods of research, the old methods of practice, in the therapeutical department, are all fast dying out, and what was once obscurity in fact, and symbolism in appearance, is being supplemented by clearness of conception and reality of presentation. Chemistry to this part of our art lends her magic aid; physics supplement chemistry; and physiology brings into action both these powerful allies: thus our therapeutical work is passing into the phase of positive science so quickly, it is hard to keep level with its posts of advancement.

Three remarkable progressions seem to my mind to distinguish modern therapeutics. The first consists in the study of the action of medicines by the investigation of the physical characteristics of each medicinal substance; the second consists in distinguishing the special action of different remedial substances on particular parts of the living organism; and the third consists in bringing the art of prescribing to the utmost simplicity, so that when we prescribe we know precisely on what we wish to rely for the good we would secure.

All these methods of improvement hang, it will be seen, closely together, and yet they are often distinctly pursued, pursued not only by different men, but by men of diverse modes of thought. They are all good and productive of the best influences. It would be incredible to our forefathers to hear that we have men now, who,—if you give them a chemical substance and tell them, This substance is composed of the following elements, it is of this specific weight, it is of this reaction, it is of this solubility, and it has certain other physical qualities therewith named,—will tell you, in return, with an absolutely near approximation to the truth, what will be the physiological action of the said substance. Yet this is an accom-

plished fact, and, in the matter of those agents we employ to relieve pain, it has been one of the most fruitful means of the development of the triumph of human art over human suffering; a development belonging truly to the whole Christian era, but most to this latter-day section of that marvellous testimony of "tho ways of God to man."

Equally strange would it be to our forefathers to hear that we can now predict where a medicine shall, to speak plainly, go into the organism, and on what it shall act. Yet, in the case of some of our most potent agents, such as arsenic, nitrite of amyl, woorali, we know, when we give them, what will be the seat in which their influence or force will be expended, as well as the nature or quality of that influence.

Finally, to the most distinguished of the older prescribers how strange would it seem to tell them, We give up that long list of agents that constituted your favourite formulæ; we are content to try one agent at one time; and as to your method of putting your medicines into the body by the stomach only, we in our day, wise as serpents and gentle as doves, put them in by the skin if we like, with a sharp tooth, or instil them in vapour by the lungs so subtly, that the administration is all but unperceived. Yet this too is daily done, and with a successful result undreamed of by the earlier pilgrims of medical progress, and certain amongst the historical steps of our time to remain.

I close my task. If any out-door friend asks of me, and many do ask, What do you of legitimate medicine more than homœopaths, or other schismatics, to advance medical science and medical art? I point such friends, as I point you, my colleagues, to the deeds of medicine I have related so feebly, so imperfectly, to-day. I ask, in my turn, Where would modern medicine have been if these things had *not* been achieved? and I affirm, honestly, that those who have achieved them, *and none other*, are the legitimate professors of the science and the art. To them I bow and declare renewed allegiance.

A word more. As I have travelled rapidly over much ground in the past hour, and mentioned many labours, I have named, you will have observed, not one solitary labourer. Why should I by name, name one? Fast as I passed from topic to topic, you recognised in every labour, the labourer, and so I spoke of them all in richer words than their names,—I mean, in their works, and "*their works do follow them.*" Happy am I in this knowledge, and

so far only shall I crave to be exceptional in my admiration, that amongst those over whom I now preside,—and who have, during my year of office, shown me indulgence I can never repay, and honour I can never forget,—are some of the most earnest labourers at the historical steps of modern medicine. That every future President may be able to refer to them proudly, as I do now, to the continued lustre of our "Alma Mater," is my last thought as I thank you for the kindness with which you have received my shadowy picture. I say shadowy picture, and so must it be; for, in relation to the future of earth, or beyond earth, we who live "*see through a glass darkly, but in time we shall know, even as we are known.*"

ON THE SCIENCE AND ART OF HEALING WOUNDS.

By Benjamin W. Richardson, M.D., F.R.S.

THE ANOMALOUS IN THE ART OF HEALING WOUNDS.

In the practice of physic of the present day,—and I do not know that the present day is at all peculiar,—there are afforded no greater evidences of division of opinion and of contradiction, than in the treatment of wounded surfaces. If we pass from hospital to hospital, in any part of the world where medicine is cultivated as a science, we see a persistent series of anomalies on the matter of treating open wounds; and not simply open wounds of any kind, but open wounds even of the same kind, in the same part of the body, and inflicted in the same way. I will suppose for matter of example, a wound shall have been made, *secundem artem;* it shall be the wound of a double incision, or flap, for amputation of the lower third of the thigh. There it is, then, presented to the sight fresh from the hand of the surgeon. One surgeon, having made the wound with all requisite skill, will proceed to dress it. He will bring the edges closely together, after sponging the surfaces with water, and will unite the edges simply with adhesive plaster, informing you, if you ask him why he objects to sutures, "that they are not in accordance with his experience." Another surgeon, equally skilful, will proceed to dress, will stitch up the wound neatly, telling you there is nothing in the world like perfect apposition of parts, and that a stitch too many is a good error; an error on the safe side, providing always the stitch be made with silk. A third will agree about the stitch, but will insist that the material of the stitch must be metallic—iron or silver wire. A fourth will dress with simple strips of bandage, dipped in water and made to surround the flaps after they have been brought together. A fifth, before he closes the wound by any plan, will carefully lay out of it the ends of all the ligatures that have been placed round the vessels. A sixth will as carefully cut off the ligatures, close to the vessels. A seventh will take up each flap carefully, and wash its surface with a

dilute saline solution, such as solution of chloride of zinc. An eighth will practically do nothing at all, but will bring the open parts loosely together by means of a cushion or a light roll of bandage; in his own words, he will leave all to nature. A ninth will put up the wounded surface in paste of carbolic acid, or will have an assistant spraying carbolic acid into the surrounding air, "to destroy germs," as he will advise you. A tenth will submit the wound to water in constant current. An eleventh will apply a simple oil dressing with an outer cap of oiled silk or cotton wool. A twelfth will close the lips of the wound with some adhesive solution after sutures have been carefully inserted.

I could multiply these instances of different methods for attaining the same object.

It is strange to observe in this matter, how unconscious the various operators seem to be of the fact of differences: two surgeons will practise precisely different dressings in the face of each other, and systematically, without appreciating the extraordinary nature of the fact. In one of our large provincial hospitals I was present on an operating day when two amputations were being conducted. The surgeon who operated in the first case took infinite pains with the carbolic dressing; the surgeon who operated in the next case passed a mere band of moist lint transversely over the flaps, securing the band with a circular roll of bandage. "I dress differently you see," he said, "from what my colleague does." "I observe you do," was the reply; "and what is the result of the difference?" "Ah!" responds he, "that is hard to decide: sometimes one of us gets a good result, and the other doesn't, and now and then we get the same result. On the whole, I think I do best; but there is a great deal yet to learn."

There is another anomaly equally glaring, I mean the anomaly of treating different classes of wounds by the same plan, the object being to heal every wound quickly by the so-called first intention. A surgeon removes a limb by double flap; he brings the flaps exquisitely into apposition, and closes the wound thoroughly from the air. (Let it be understood I am relating now only what I have seen.) His patient is removed, and another patient is placed on the table with a large fatty tumour on the back. Over this tumour the surgeon makes his incision, takes out the fatty growth, and leaves a cavity into which one could easily put a middle-sized orange: again he brings the edges of his wound together, and carefully seals up. He aims in both cases at healing by the first intention.

These anomalies in the management of simple wounds become more complicated as the wound presents complications. In cases of compound fracture, or of compound comminuted fracture, for example, not only are the various differences, as to the external dressings, sustained, but almost as many different methods, in respect to the treatment of the injured bone.

BASES OF THE ART AND THE SCIENCE.

To approach towards perfect success in treating wounds, it must, I would submit, be conceded that the practical science and art of healing will never be extracted or formulated by indulging in speculations respecting influences lying outside the immediate object of cure. I mean by this, that when we see a wound heal well, and quickly, and soundly, we must not thereupon conclude that the cure is due to some extrinsic influence which we, in supposed wisdom, have brought mysteriously into play.

"Take," said the illustrious Paracelsus, "take of moss growing on the head of a thief who has been hanged and left in the air, of real mummy, of human bloodstill warm, of each one ounce; of human suet, two ounces; of linseed oil, turpentine, and armenian bole, of each two drachms. Mix all well in a mortar, and keep them in an oblong hollow urn. Then when a wound has been inflicted, take the weapon with which the wound was made, or, if it cannot be had, a sally rod dipped in the blood of the wound, anoin either carefully and lay by in a cool place. To the wound do nothing except wash it in fair water; cover it with a clean soft linen rag, and do no more except open the wound once a day, and clean off all offensive or purulent matter. This is a certain cure for all wounds unless those which have penetrated the arteries, the heart, or the brain." "It was given," says Master Foster of Hedgeley, writing about it in 1631, "it was given in this way to the world. The divell gave it to Paracelsus, Paracelsus to the emperour, the emperour to the courtier, the courtier to Baptista Porta, and Baptista Porta to Dr. Fludd, a doctor of physicke, yet living, and practizing in the famous city of London, who now stands toothe and nayle for it."

Sir Kenelm Digby, gives us another and better known system of cure: instead of the ointment which the devil gave to Paracelsus, he orders the weapon that inflicted the wound to be treated with sympathetic powder; and instead of the water dressing, he bids that

the wound be closely shut up, and be kept sealed for fourteen days, by which time the healing will of a certainty be complete.

I quote these, as examples of extrinsic beliefs, standing apart from the influences that were at work in the actual process of cure. The theory both of Paracelsus and of Digby was to the effect, that the wounds healed by sympathy, a fictitious influence which had to be provided for. In a word, all anti-sympathetic agencies to the healing of wounds, agencies one could neither see nor define, had to be removed, or the wounds would not heal; but removed, the wounds would heal. We may laugh, yet in our own day we have seen precisely similar fictions illustrated in an equally striking manner, in support of different but not less idle hypotheses.

I would submit, further, that the science and art of healing wounds will never be perfect, so long as we keep to the blind belief or faith in what is called the *vis medicatrix naturæ*. I repeat in relation to wounds what I have often said in reference to general disease, that nature does never systematically bend herself, or put forth her hand to help the curer. I mean by this, that she never deviates from her path. If we do not molest her she goes on, as we say, naturally; if we molest her very little, she goes on, and the molestation is but little shown; if we molest her vehemently, she still goes on, showing molestation in proportion to disturbance. Thus, while the blood is running in the unimpaired vessels of a living part, we say that is natural; if the part be divided and the blood runs out, we say that is unnatural; but if we bring the divided parts neatly together again, nature not changing her design a jot, the blood is carried on, and the parts reunite. If, in addition to dividing the parts, we cut away a portion so as to leave an open space, nature, still aiming to keep on her usual course, but molested too urgently, will perchance kill the patient by hæmorrhage, if art be not there to stop her; or, prevented in this blind persistence in her undeviating course, she will simply supply, as far as she can under the circumstances, the continuous process it is her business to sustain. In brief, it is basic error to assume that nature bends to cure: it is basic truth that the curer must consider nature as an inflexible line, to which he must, by art, bring up his curing; assured that if he cannot effect so much, nature will not help him, but will go her own way, caring just as little for ease as for pain, for life as for death.

It is necessary, as a preliminary study, to determine whether or not there are certain great results to be secured by a certain fixed rule,

or by certain fixed rules of art; whether it be known that wounds will heal directly, even against what seem unfavourable circumstances; and whether, if this be known as an exceptional fact, we can so raise ourselves in knowledge as to make the exception the rule.

Let me argue out this position from a few particular illustrations.

Mr. William Adams removed the foot of a young gentleman by Chopart's operation. The cuboid bone and the os calcis were anchylosed, and the saw had to be used freely to divide the bony structures. Several vessels had to be tied, and the ligatures were left suspended from the wound. The lips of the wound were brought neatly together, (all the parts fitting in excellent position,) and were secured together by fine wire sutures. With Mr. Adams' permission, I coated the edges of the wound and closed them with the solution of tannin, benzoin, and xyloidine, known as styptic colloid, covering the whole with cotton wool and a light bandage. At the end of three days there was no discharge, and no fœtor; but as Mr. Adams was anxious to see the condition of the wound, I removed the dressing, to find the surface perfectly healed throughout. Unfortunately, from an adhesion of the bandage to one of the ligatures, I tore open, in removing the bandage, a small part, about a quarter of an inch, of the freshly healed edge, and on this spot there formed, two days later, about a drachm of pus, in a superficial fissure; but the break quickly reunited, and at the end of sixteen days the patient left town, the wound perfectly healed by the first intention, and by one primary dressing. Not a single constitutional disturbance occurred during the time.

In another case, in a woman of middle age, Mr. Adams removed the breast for cancer. The lips of the wound were brought together in the same way, and a like dressing was applied. As in the previous instance the wound healed throughout its whole length under the primary dressing, and so perfect was the cure, that an accident of secondary hæmorrhage from a small vessel did not disturb it; an artificial opening having ultimately to be made to allow of the escape of some effused fluid.

Here are two remarkable cases: one showing that even when bone has been freely sawn across, there may be perfect healing by the first intention; the other showing that the same event may occur although there be deep secondary hæmorrhage beneath the divided surface.

I have selected these cases from many others, simply because of their severity, and this leads me to the question—Why cannot we always, in primary wounds, secure the same results?

What has once been done, ought in the majority of cases to be done again and again; yet so rare is it to see the phenomenon of complete healing by the first intention after extensive division of bone, that a leading surgeon expressed to me he had doubted the possibility, until Mr. Adams' patient showed the fact. Nay, so rarely is absolute success secured, even in simpler cases, that I doubt if the successes exceed seven or eight per cent.; successes, I mean, of such a nature, that on taking off the first dressing, an extensive wounded surface is found absolutely cured, free of fœtor and free of discharge.

I repeat,—Why is this so? Why do we not find failure the exception, success the rule?

OBSTACLES TO SUCCESS.

There are, I think, several causes for the results as they now stand, which causes I shall try to enumerate in the briefest possible terms. Some of these are remediable, others are not: I will treat of the remediable first.

One obstacle is a due want of care on the part of the dresser of the wound in bringing the divided surfaces into perfect relationship with each other. It should be remembered always that cut surfaces of an animal body are colloidal surfaces, and that when such surfaces are well adapted, the physical attraction of cohesion is at once set up between them. This attraction perfected, half the battle of healing is won. This left imperfect, half the battle is lost: air is left in the open spaces; the air has to be absorbed, or to be employed in oxidizing the tissues with which it is in contact, and the result is foreign action in the part, and arrested union of structure. If a plan could be adopted by which the flaps of a wound could be brought together by suction, so that the pressure of the atmosphere would only make the union of surface the closer, healing, I suspect, would be virtually an instant process, the attraction of cohesion in colloids being so absolute when it is perfect, that it cannot be broken without violence and new rupture of structure. I have however observed many excellent surgeons excessively careless in this matter of dressing wounds; I have seen them leave the parts separated by abundance of atmospheric air, with space for the collection of any gases that may occur from decomposition, and expect cohesion under circumstances so physically opposed to cohesion.

For let this always be remembered, that the primary product of decomposition of organic matter is gaseous. As when we pour dilute sulphuric acid on zinc we get evolution of hydrogen, so in decomposition of living animal structure we get evolution of sulphuretted gases; these expand, invisibly escape, tear open their way for escape, break up recently formed connections of tissue, and make vacuities into which plasma must exude, in its turn to decompose and yield more gaseous matter.

A second obstacle to the healing of wounds is the employment of water in dressing them. To lave an open colloidal surface, capable of absorbing water as only a colloid can, and then to close the surface with this great oxidizer, water, in contact, is like trying to prevent the rusting of metals by exposure of them to moisture. To dress a wound in its own blood, is the approved experience of centuries; and the man who will trust it will never regret the trial. Moreover it is quite unnecessary in any case to drench with water: a sponge simply moistened with *distilled* water is all the surgeon requires in the worst cases, and he can, with practice, do without anything further than a soft dry linen cloth.

A third obstacle to healing, is the too prolonged exposure of the wound to the air, with too much manipulation of surface. I notice often the fingers of three or four persons in an open wound during an operation, and I have seen a large flap exposed for several minutes, on the hesitation whether a bleeding point should be secured. Now, to secure a bleeding point is no harm, but to keep a wound exposed to the air is harm, inasmuch as during the exposure the whole chemical action of the part is undergoing change. The natural alkaline surface is becoming an acid surface, muscular fibres are shrinking, exuded plasma is coagulating, surface temperature is running down, divided nerves are suffering irritation, and every condition requisite for rapid re-union by perfect attraction of cohesion is being ruthlessly sacrificed.

A fourth removable obstacle to healing, lies in the arrangement of the ligature put on bleeding vessels. To cut off a ligature of silk closely, is to leave in the wound a minute filament of fibroïn, a substance colloidal in nature, easily soluble and harmless; but to leave some inches of the same dangling out of the wound, and thus to make a channel for entrance of air, is a practice utterly opposed both to science and art in the process of healing. True, we may

see the whole length of silk absorbed, with perfect healing; but it is as foolish to expect that result often, as it is unnecessary ever to court failure.

Within the last few months, a great improvement has been made in the closing of vessels against hæmorrhage, by the method of torsion of the vessels. This method, which has been in use for many years for small vessels, is now found to be applicable to vessels of very large size; as for example, the radial, the ulnar, the tibial vessels, and the derivatives of all the large trunks. Whether it will be found to answer for the large trunks themselves, as the axillary, the brachial, the femoral, for instance, is yet a moot point; but the application, so far as it is safe, marks an important advance.

The fifth obstacle to healing is found in the various methods of dressing the closed wounds. The common method of closing up with adhesive plaster is most objectionable. The plaster does not exclude the air, it produces unequal pressure, it cannot be removed without disturbing the wound unless water be used to soften it, while the contact with water is in itself a worse evil than the disturbance. The simple water dressing is objectionable: first, because it exposes the wound to the action of water; and secondly, because the moistened cloths become dry, adhere to the wounded surface, and cannot be removed without disturbance. The closing up of the wound with an impermeable sheeting, such as gutta-percha or oiled-silk, is also objectionable, for the simple reason that this form of covering adheres firmly to the surface after a few hours, and its removal creates disturbance of the wound, and severe pain.

On the whole, it may be laid down as a sound rule in practice that no dressing is good which in the end adheres firmly to the dressed part, which connects the line of the wound with the surrounding structures, and which causes pain and tearing of the new adhesions in the act of its removal.

A sixth obstacle connected with the mode of dressing wounds that are intended to heal by the first intention, relates to the period at which the wound is opened and examined. Celsus, and after him Fabricius, allowed the wound to remain untouched for three days; the followers of Sir Kenelm Digby waited for ten and even fourteen days; but after the teachings of Ambrose Paré the wound was dressed at the end of twenty-four hours. Benjamin Gooch, the most classical writer on this subject, held by the last named

practice. I am convinced, for my part, that the older men were most correct, and that we modern men do infinite mischief by too early an exposure of wounded surfaces. I believe the error that has arisen on this point, as well as the anxiety to interfere, is a natural result of the prevailing practices of dressing wounds. Under the modes now followed, suppuration is so frequent an event in the course of a few hours that surgeons look out for it as a condition to be specially recognised and treated. Hence, often when there is no occasion to meddle at all, the wound is opened, and the newly healed surfaces are disunited. It is hard I know to wait, the patient thinks nothing is being done for him, and the surgeon is anxious to see what is going on. But when the mode of dressing is good, so long as there is no fœtor from the wound, so long as the pulse is tranquil, so long as the clinical thermometer registers no rapid elevation of temperature, the practice is to wait with patience. We take off our dressing then, when, as Gooch says, "the part itches," and we find a wound soundly cicatrised.

The last and perhaps the most frequent obstacle to success, is an error of judgment on the part of the dresser, whether there be in the case presented to him, sufficient continuity of surface to warrant him in trying to heal by the first intention. I know I have myself often made a mistake on this subject, and I often see in others carelessness in respect to it. Of course the desire is always to heal straight-away: but sometimes the desire is the sole parent of the attempt, and the result is disaster. I will undertake indeed to say, that more than half the failures met with are due to the circumstance that an effort is made to cure by the first intention, when owing to destruction of substance attraction of cohesion of the divided surfaces is impossible.

HEALING BY THE FIRST INTENTION.

What then is the best method of treating a wound so as to make it heal by the first intention? My answer to this is, that if the wounded surfaces be so brought together that the attraction of cohesion can come perfectly into effect, no spaces, including air, being left between the surfaces, then the process of dressing is as simple as it is effective. This process consists, first, in removing all possible foreign matters, such as shreds and ends of ligatures, or clots of blood from the wound; secondly, in

bringing the surfaces closely together; thirdly, in closing as neatly as possible with silk suture; and fourthly, in applying over the lines of the suture, so as completely to close up the divided surface, an adhesive colloidal substance, which will produce no irritation, will effectually exclude the air, and will be elastic and styptic. We may care little what this colloid is, so long as it possesses the qualities named: it may be the fresh blood of the subject, it may be gelatine. I have introduced the solution known as Styptic Colloid, and it answers very well; but I have not the slightest prejudice in favour of it, in preference to anything as good, so long as the principle is carried out of using a colloidal adhesive fluid: a substance that will not be absorbed, will not irritate, will not poison, and will well and thoroughly seal up the divided part.

I should state that styptic colloid is a solution of tannin in xyloïdin or collodion, xyloïdin yielding the most elastic and therefore preferable compound. The solution is made by dissolving tannin in absolute alcohol until there is produced a soft, almost gelatinous-looking mass; this is left for some time (a period of three weeks) in a closed vessel; the mass is then taken up with absolute ether until a thin fluid is obtained. In this fluid, either xyloïdin or gun cotton is dissolved to saturation; and finally, a little gum benzoin is added to give an agreeable odour.

In dressing a wound with styptic colloid the solution is applied over the line of incision, already closed by suture. It is put on with a brush, and should be laid on in two or three distinct layers, time being allowed between each application for the solution to dry. A little finely cut cotton wool is then laid in the line of the wound over the colloid, and a final layer of colloid is applied over the cotton to hold it in its place.

In many cases I have been content to leave a large wound simply closed in this way; but it may happen, as for instance in the case of flaps after amputation of a limb, that some support is required. Under such circumstances, I give the support by means of a bandage of fine dimity that has been dipped in a solution of oil and stearine dissolved in hydramyl. This bandage easily unrolls from off the wounded part when it is proper to remove it, and it is so readily applied and re-applied that it may be removed and renewed at any time, without danger of disturbing the wound. Should it adhere in the least, the addition of a little oil and hydramyl will at once loosen the adhesion.

Presuming that all wounds fit for healing by the first intention were

treated in the above manner there would I believe, on the best experience, be an entire change in the results of treatment, a change that would turn over the majority of cures in favour of healing by the first intention. There would however still be certain cases of failure. Why?

Failure will occur from no error in dressing the wound, but from internal causes, to use the only ready term. Nervous lesions influencing the vascular supply of the divided part form one cause; the accidental introduction into the wound of animal colloidal decomposing matter another; the generation of organic poisonous products within the body a third. These causes all lie apart from the science and art of dressing the wound: I leave them therefore for a future and special dissertation.

HEALING BY THE SECOND INTENTION.

And now I am led to a fresh consideration. In any case where the first intention cannot be carried out, what is the most scientific way of securing what Gooch calls healing by the second intention?

In the older surgery, healing by the second intention, "healing from the bottom" as it is commonly characterized, was all but exclusively practised up to the fifteenth century, and it continued in use as a distinct system into the eighteenth. It consisted principally in the application of aromatic and pure bituminous substances, which were introduced into the wound, and the after closure of the wound with balsam—"baal-samum"—prince of oils. As a general practice it was sound, but it was slow; it was no wonder therefore, after the discovery was made that wounds would heal by the first intention, that it lost caste and gradually sank in estimation. One of the grandest errors in surgery, however, has been the dismissing of it altogether in the treatment of acute wounds, and in aiming always, roughly or refinedly, scientifically or unscientifically, to heal by the first intention, and by that alone.

It is of moment to recall the old practice to its true position, and to insist that whenever a surgeon looks upon a wound with the object of curing it, it is his first business to ask himself:—"Shall I try to heal this wound by the first or the second intention?" If he can bring three-fourths of the divided surface into contact for attraction of cohesion; if the wound is newly made and has upon its surface no secondary product; if he can remove

all foreign matter from the wounded surfaces; and, if the surfaces be of alkaline or neutral chemical re-action, he should then proceed to heal by the first intention. If, on the other hand, these conditions, one or more, be not present, he should, I maintain, hesitate not a moment, but proceed to heal "scientifically" by the second intention.

For this purpose again nothing answers so well as a colloidal fluid. It may be used in one of two ways. When the lips of the wound approach each other, and the breach of continuity is underneath the divided surface of the skin, so that the edges of the skin fall into the cavity beneath, the operator should paint over the surface beneath the skin, freely, with styptic colloid. He then should saturate a piece of cotton wool with the colloid, and, bringing the lips of the wound together with a loose stitch, if needed, should lay the saturated wool over the wound and apply a light compress or oiled bandage as already described. If there be no discharge, pain, or constitutional symptom afterward, he may allow the dressing to remain until the healing is perfect: if there be discharge, he may remove the dressing and re-apply the colloid.

If the wounded surface be actually open, and the edges of the wound wide apart, the surgeon may simply paint the whole exposed surface freely with the colloid, and cover it with cotton wool charged with the fluid. He should then apply a light compress of lint saturated with oil, and allow the dressing to remain until the healing is perfected, if there be no discharge or other symptom calling for interference.

Let me give one or two typical illustrations of this mode of healing.

A patient of mine suffered from four large cystic tumours on the back, the smallest of which was of the size of a walnut, the largest the size of an orange. The smallest was removed by a straight incision and the simple evolving of the tumour. It seemed to me that in this case I might try to heal by the first intention. I therefore closed the wound neatly with silver sutures, and dressed it with styptic. The result was an utter failure; slough formed in the wound, and the healing had to proceed by granulation from the bottom. The part was not soundly healed under eighteen days.

The three other tumours were next removed at intervals of a week apart. The wounded surfaces were treated for healing by the second intention, viz., by painting over the inner surface with colloid, putting

in a loose stitch, covering the cavity with a pledget charged with colloid, and applying a light compress coated with oil. The wounds in these cases healed with the single dressing, and were each well healed in seven days.

Mr. Adams operated on the finger of a young gentleman for enchondroma. He gouged away the diseased bony part after a free incision, leaving a wound the lower portion of which was of bony structure. I dressed this wound by simply filling the cavity with cotton wool saturated in the colloid, surrounding the whole with oiled cotton wool and a bandage. In this case there was perfect healing straight-away.

In a case of strumous disease of the knee, in the child of a professional friend, it became necessary, in order to save the limb, either to remove the joint, or to adopt the middle course of cutting down by a free incision upon the diseased bone and treating with cotton wool saturated with colloid. The latter plan was adopted, at my suggestion: some loose portions of bone were removed, the fluid matter in the wound was mopped out with the colloid, and the wounded surfaces were filled with cotton wool charged with the colloid. The results were an instant relief of pain, the gradual evolution of more dead structure, and in five weeks the most perfect healing up of the wounded surfaces. There was left a sound, though of course a stiff, limb.

VALUE OF IODINE IN THE TREATMENT OF WOUNDS FOR HEALING BY THE SECOND INTENTION.

I cannot avoid alluding in this place to another agent most useful, in certain cases, for the cure of wounds by the second intention. That agent is iodine. Iodine combines excellently with colloidal fluids, it causes no irritation, and it is simply perfect in its action when it is called into use in the proper place. I employ iodine in addition to the styptic colloid whenever there is peculiar fœtor with discharge, as in wounds about the rectum, and in wounds into which blood has extravasated, coagulated, and decomposed. In a case of varicose veins of the scrotum operated upon, at my request, by my esteemed friend Mr. Henry Lee, there occurred, from an accidental interference of the patient, secondary hæmorrhage, an open wound, and a decomposing clot of blood in the wound. We did not risk removing the clot, but dressed freely with iodine, and cured direct. Iodine deodorizes, controls discharge, destroys

decomposing products, and, purely local in its action, does no systemic injury.

SUMMARY AND CONCLUSION.

I have now only to offer, in a few short clauses, a summary of the subject that has been before us. These clauses run as follow :—

The rules of surgical science and art in relation to the treatment of wounds require to be consolidated, so that on so simple a matter of treatment, regarding which there cannot be more than three or four absolute causes of divergence of practice, there may be unanimity of opinion.

It is proved that wounds of the most extensive character will heal by the first intention. It is proved that according to our present attempts at healing by the first intention the results are only exceptionally successful. This is a false position, and the reasons for it require to be examined.

The reasons, when examined, are found to be :—(*A*, *and chiefly*) Inattention in determining whether a wound presents sufficient surface of approximation to unite by cohesion when its colloidal surfaces are brought together : (*B*) Carelessness in dressing the wound, in exposing it too long to the action of the air, in over manipulation, in treating too freely with water, in allowing foreign substances, ligatures especially, to remain within it, in failing to close it with due precision, and in re-opening it too precipitately for new dressing.

These radical faults are, it is suggested, sufficient to account for all that occurs in the way of avoidable causes of failure : so that there is no necessity to resort to any remote and occult theory to explain failure ; at all events not until the simpler opposing causes to success are remedied.

It is proved that there are certain cases, a limited number, in which, under proper selection of case, healing by the first intention will be frustrated. These are cases in which disorganising matter has been introduced into the wound ; or in which there has been nervous injury affecting the vascular supply of the wound ; or in which there has been generated, in the body at large, some disturbing or lethal influence. These cases, it is held, are special, have no direct relation to selection for healing by the first intention, and require to be considered and discussed as a distinct subject.

When a wound, properly selected, has been put up for healing

by the first intention, so that its surfaces are in apposition, and it is thoroughly sealed from the air, it need not, it is urged, be interfered with unless nervous symptoms ring out the alarm. Much harm, it is contended, springs from undue impatience to re-open and examine healing wounds.

If in any case it be found that the break of substance or loss of substance in a wound is so extensive that the colloidal surfaces cannot be brought into easy contact, it is best practice to endeavour to heal by the second intention, and this whether the wound be or be not complicated by fracture of bone. Healing by the second intention is best carried out by removing all foreign substances from the wound, by letting the parts fall as simply as they will into contact, and by excluding air as effectually as possible, without exerting undue tension or pressure.

The best substances for excluding the air in the healing of wounds, either by the first or second intention, are colloidal elastic styptic fluids; such as tannin, with colloidal cotton, or with colloidal starch, (xyloïdin.) These in combination exclude air, exert a healthy influence on the wound by fixing the plastic exudative matter, and produce no local nervous disturbance,—irritation. In cases where fœtid discharge has formed, iodine is an important addition to the colloidal method.

Lastly, it is contended that as between healing by the first and healing by the second intention, the process differs only in respect to the time required for its completion, it is in accordance with the science and art of healing to cease all attempt to heal by the first intention when distinct systemic symptoms proclaim danger, and to proceed to the method of treatment for healing by the second intention, in the manner detailed in the body of this paper.

It will be seen, I trust, that the object of this essay is to remove, if possible, the present chaotic state of opinion on the treatment of wounds, and to bring the minds of surgeons to some simple and common principles of action,—so that failure may be the accident, success the rule. According to my view, we medical men live to cure; to cure all we can, and to try to cure everything, through whatever tribulation or even folly we may pass in the effort; for "this sore travail hath God given to the sons of man to be exercised therewith."

I believe it is given to us to cure without limitation, and that for us to say to sick and dying men, "here we must leave you to die, for our art is limited," is to hand over our art to the quack, and to

cast our glorious past history into the pit of desolation. Once, the art being limited, men and women groped in darkness who in these days would see. Once the affection known as stone in the bladder, the art being limited, was a suffering to inevitable death; now it is curable. Once, very recently, the art being limited, ovarian dropsy was a hopeless malady; now it too is curable. Once surgery and pain, the art being limited, like good and evil linked together, marched together; now the evil is disposed of, the good remains. These are victories won; great as any that can be won; forecasts of what *will* be won if we believe in ourselves and our vocation. Meanwhile, if we could become unanimous in respect to the current progress of our science and art,—if in this simple matter of treating wounds, for instance, we could be of one mind,—we should strengthen our bases of operation, should clear up as we went on, and should go on, more connectedly, noiselessly, powerfully, towards new and certain conquest.

OIL OF TURPENTINE AN ANTIDOTE AGAINST POISONING BY PHOSPHORUS.

(*An Abstract of a Monograph about to be Published.*)

By H. Köhler, M.D., Professor of Therapeutics in the University of Halle, Germany.

Regarding the antidotal effects of the Oil of Turpentine in acute poisoning by Phosphorus, there are six leading questions to be answered :—

Whether oil of turpentine really is an antidote against phosphorus?

Whether every kind of the oil of turpentine is equally useful as an antidote against phosphorus ?

Whether the oil of turpentine exercises its antidotal power, into whatsoever part of the body it may be introduced ; or, if this be not the case, which is the fit place of application ?

What length of time may be permitted to elapse between the ingestion of the phosphorus and the administration of the turpentine, if life is to be saved ?

In what dose and form should oil of turpentine be employed as an antidote against phosphorus ?

What are the chemico-physiological processes whereon the antidotal effects of the oil of turpentine against phosphorus are founded ?

1.—To the *first question* an answer has been attempted by M. F. Perronne (*Compt. Rend.* 9 *Mars*, p. 543, 1869); Curie and Vigier (*Gazette Med. de Paris*, No. 49, 1869); H. Schimpff, "Ueber die Phosphorvergiftung und die Wirkung des Terpentins als Gegengift," (*Dissertatio Inaugural. Halle*, 1870.); and the Author of this article himself (*Berlin. Klin. Wochenschrift*, 1870, No. 50).

Curie and Vigier, relying on their experiments, which in my mind raise many doubts, denied the effect of the remedy. In all probability they experimented with highly rectified spirits of turpentine, while Perronne, Schimpff, and the Author, used in their experiments the commercial oil of the shops, which, through the influence of the light and the atmosphere, contained ozone and oxygen. Besides, as Curie and Vigier did not institute any dissections of the test-animals which

died, it is not clear how many of them were killed by phosphorus, how many by too large doses of turpentine, and how many by other casualties, *e.g.*, by the oil finding its way into the trachea. Detailed criticisms of the studies of Perronne—who, speaking of the antidotal effects of the turpentine, says that it prevents the oxidation of the phosphorus by the oxygen contained in the blood—as also of those of Curie and Vigier, will be found in full in a monograph by the Author, soon to be published.

Dr. Schimpff, assisted and directed by the Author, has instituted an extensive series of experiments on rabbits and dogs; the largest doses of phosphorus used being 0·09 grm. (1·39 gr.), enough to kill a grown-up man. He used not milligramme doses only, as Bamberger relates, and as Vetter incorrectly repeats (*Virchow's Archiv., L. III.*, 2 & 3 *Aug.*, p. 204, 1871).

The last-named writer, Vetter, confirms generally the experiments of Schimpff and the Author.

The combined administration of the largest possible doses of phosphorus and of oil of turpentine into the stomach was by no means intended, but rather the use of lethal doses in relation to the volume and weight of the test-animals, according to the observations of Curie and Vigier on rabbits, and to those of others on the poisoning with phosphorus in human beings. The deadly dose for a rabbit or dog was proved to lay between 0·003 (·046 gr.) and 0·09 grm. (1·39 gr.) of phosphorus.

To 0·01 grm. (·154 gr.) of phosphorus, 1·0 grm. (15·432 gr.) of oxygenised oil of turpentine was added, with the following results :— The test-animals, 1, 2, 4, 11, 12, 13, 14, 16, and 17 survived the ingestion of the phosphorus; 3, 5, 6, 7, 8, 9, and 10 died after its administration. Of these last, 3, 5, and 6 (rabbits) died of gangrenous pneumonia, owing to the phosphorus entering the lungs; 7 and 8 of pneumonia, caused by the oil of turpentine entering the lungs; and 9 and 10 of asphyxia, from an unknown cause. None of the animals were killed by phosphorus, as was evidently proved by the most carefully instituted and recorded dissections, and by the negative results, as to the presence of phosphorus, of the chemical analysis of the contents of the dead bodies, made by the Author according to the method of Fresenius. Reason enough here, and well-founded reason too, for pronouncing the common commercial oxygenated oil of turpentine an antidote against phosphorus.

Vetter confirmed the experiments of Schimpff and myself, but held the Ol. Terebinth. Gallicum to be the antidote *par excellence*

against phosphorus poisoning; a view to be considered presently.

2.—As to the *second question*, whether every kind of oil of turpentine may be used as an antidote against phosphorus, I have already said, in my preliminary communication, that the desired end can only be attained by the common commercial oil of turpentine containing oxygen.

As the result of his not very numerous experiments on animals, Vetter (*loc. cit.*) proclaimed the Ol. Terebinth. Gallicum as the only safe antidote. Without referring to the Ol. Terebinth. Venet., and others, he classifies the oils of turpentine most in use, however erroneously, as German, French, and rectified oils: forgetting, on the one hand, the much used English and the still better American oils; and on the other hand, the fact that these three kinds of oil of turpentine are sold either as crude or as rectified oil, whether they are derived from Pinus sylvestris, Pinus abies, Pinus picea (German), Pinus maritima (French), Pinus taeda, or Pinus Australis (American). Thus it is obvious that Vetter has confounded the points of classification as to origin and production. In regard to a most essential point—the different polarizing powers of oils of turpentine—Vetter does not appear to have had any knowledge. The English oil of turpentine turns the plane of polarization toward the right, while the German, French, and Venetian divert the plane to the left. Now, the author of the present paper raised the question which of the different kinds of oil of turpentine, the one turning polarization to the right, or those turning it to the left, would form, in connection with phosphorus, the terebinthino-phosphorous acid; for it is on this chemical change, this production of a non-poisonous compound, that the antidotal power of oil of turpentine rests. Not having studied this matter before, I made twenty-nine comparative experiments respecting it with a great many different kinds of turpentine. Weighed amounts of phosphorus, together with weighed quantities of oil of turpentine, were heated in previously weighed small glass cucurbits for exactly fifteen minutes in a water-bath of 30° to 40° C. (86° to 104° F.), and allowed to get cold in the same place. Waiting just twenty-four hours, I weighed the crystallized substance on filters which had been previously weighed, squeezed these out strongly, and weighed again; extracted the filters and cucurbits with alcohol, dried the whole in the exsiccator as far as possible, and re-weighed. I thus got the per-centage—

(*a*) Of the quantity of the terebinthino-phosphorous acid crystallized after twenty-four hours, and produced by the contact of the phosphorus with the oil of turpentine during a quarter of an hour:

(*b*) And of the quantity of the phosphorus remaining undissolved, unaltered, crystallized, and adhering to the cucurbit and filter.

The greater the quantity of the resulting crystals of terebinthino-phosphorous acid, and the smaller the quantity of the undissolved phosphorus, the more useful as an antidote against phosphorus is the species of oil of turpentine employed in the experiment to be regarded. The kinds experimented on were :—

(1) Oil of turpentine, recently several times rectified (German).
(2) Oil of turpentine, rectified a week previously, and kept in a dark place (German).
(3) French oil of turpentine.
(4) Common commercial German oil of turpentine.
(5) English oil of turpentine.
(6) Samples of the oil (No. 2) exposed to the light and the oxygen of the atmosphere during six weeks.

My view—based on chemical considerations of the constitution of the terebinthino-phosphorous acid—as to the generation of the acid only by means of oil of turpentine containing oxygen, that is, by oil which has been exposed for a long space of time to the influence of the light and atmosphere, was thus most emphatically confirmed; for the experiments, hereafter to be described *in extenso*, showed :—

(*a*) That after the use of recently rectified oil of turpentine, be its polarizing power to the right or to the left, phosphorus crystallized unaltered, terebinthino-phosphorous acid not being produced.

(*b*) That all species of oil of turpentine kept some time (and so containing oxygen) gave more or less terebinthino-phosphorous acid, whatever their optical qualities or their original source.

(*c*) That all well rectified oils gave less of the cetaceum-like terebinthino-phosphorous acid than the non-rectified ones.

(*d*) That between the rectified species on the one hand, and the non-rectified on the other, there existed no marked difference in their power of production of the innocuous acid.

(*e*) That rectified commercial oil of turpentine, if exposed to light and air for a long time, produced very nearly the like

quantity of terebinthino-phosphorous acid as the crude oils of the shops.

(*f*) That oil of turpentine may be made capable, by exposing it to the light and air, of being used as an antidote against phosphorus.

The following tables clearly demonstrate these statements.

German oil of turpentine, rectified eight days previously, gave the small per-centage here shown :—

No. of Experiment.	Quantity of Phosphorus employed.	Quantity of the Oil of Turpentine employed.	Proportion of the Oil of Turpentine to the Phosphorus.	Undissolved Phosphorus.	Product of the Acid. Terebinth. Phosphoros.	Proportion per cent. of the Product to the Phosphorus & Oil of Turpentine used.
	Grms.	Grms.		Grms.	Grms.	
3	0·705	36·345	50 : 1	0·034	1.035	2.796
4	0·06	4·906	85 : 1	0·030	0·985	2·006
5	0·40	40·370	100 : 1	0·02	1·94	2·928

The gain of terebinthino-phosphorous acid, if oil of turpentine was used which had been exposed to the influence of light and air for a month, was as follows :—

No. of Experiment.	Quantity of Phosphorus employed.	Quantity of the Oil of Turpentine employed.	Proportion of the Oil of Turpentine to the Phosphorus.	Undissolved Phosphorus.	Product of the Acid. Terebinth. Phosphoros.	Proportion per cent. of the Product to the Phosphorus & Oil of Turpentine used.
	Grms.	Grms.		Grms.	Grms.	
27	0·755	19·947	26·41 : 1	0·045	2·440	11·78
28	1·380	42·080	30·42 : 1	0·031	2·278	10·28
29	0·918	38·365	41·78 : 1	0·050	3·959	10·07

Even highly rectified oil, therefore, without reference to its origin or its optical powers, will, if exposed to the influence of the light and the oxygen of the atmosphere, gain more and more a likeness to less rectified oils as to their faculty of reducing phosphorus into the harmless substance, terebinthino-phosphorous acid.

From the above facts it appears that—

I.—If the last proposition be equally applicable to the ol. terebinth. Gallicum, so praised by Vettèr as an antidote, and if he in his

cases of phosphorism obtained favourable results with French oil only, and unfavourable results with the rectified (of what origin is not stated) and German oils, the cause is to be found, not in the species of the oil of turpentine, but in the fact of his ol. terebinth. Gallicum being badly rectified, and therefore containing much oxygen, whilst the German oils previously used, had but shortly before been rectified, and were poor in oxygen.

II.—Vetter's assertion that I recommend commercial oil of turpentine containing much oxygen, as an antidote against phosphorism, while I experimented with the rectified oil on the sick bed, is refuted. For it is proved by my experiments that oil of turpentine, badly or long rectified, under the conditions mentioned, produces with phosphorus the harmless compound just as efficiently as unrectified German, French, or English oil. All depends upon the contained oxygen, nothing upon the origin or commercial species.

III.—In the case of poisoning with phosphorus, a distinct order should be made on the prescription for the apothecary to dispense long-kept rectified oil.

IV.—It is to be remarked that, in the case of all oils that contain a large quantity of oxygen, if there be a surplus of them in proportion to the phosphorus, the product of terebinthino-phosphorous acid will after a time be unexpectedly small. The reason of this is the fact that the harmless product of the combination of phosphorus and oil of turpentine is soluble in the latter substance; the product being formed, indeed, though not crystallized, more of the oxygen is attracted and bound, and finally, agreeably to the description of Bamberger, a red-yellow resinous substance, containing, not phosphorous acid, but phosphoric acid, is separated. Now, since absorption as well as elimination of this said compound, which possesses little or no toxic effects, can but be promoted by its being in a soluble state, a surplus of the oil of turpentine, if the dose be not a poisonous one, may appear to be not only not injurious, but even desirable. To this point I shall refer more fully when discussing the fourth question.

3.—To answer the *third question*, whether oil of turpentine is effective as an antidote against phosphorus by whatever way it may be administered, or to whatever part of the body it may be applied, none of the former experimenters have tried. I hope that some ten experiments which I have made on frogs and rabbits have solved the question.

Into these animals I introduced—

(*a*) Phosphorus into the stomach, and oil of turpentine under the skin;

(*b*) Phosphorus into the rectum, and oil of turpentine under the skin;

(*c*) Phosphorus, and afterwards oil of turpentine, into the receptacle of lymph on the back of frogs.

All of them died, and their bodies showed the characteristic pathological signs of poisoning by phosphorus.

The method for rectal administration, used particularly by Curie and Vigier, who corked up the anus of the test-animals, is not, I consider, a satisfactory one, since the animals always very quickly expel the phosphorus and oil; while the constantly needed further injection, to compensate for the lost substance, and the repeated corking up of the anus, as practised by the authors named, is highly irritating. My experiments and my deductions therefrom, soon to be published in full, show with convincing certainty that it is only by phosphorus coming into contact with oil of turpentine in the stomach that the innocuous combination, terebinthino-phosphorous acid is produced, and that only then and in that way may oil of turpentine be termed an antidote against phosphorus.

4.—The *fourth question*, how much time may elapse between the ingestion of the phosphorus and the use of the oil of turpentine, without the latter failing to exhibit its antidotal faculty, is by no means in a condition to be answered, too little clinical material being at hand, and animal tests not as yet being, nor to be expected to be, very relevant in this direction. The longest intervals of time between the poisoning and the successful application of the antidotes, amounted to eleven hours. (Observation of Author in the *Klin. Wochenschrift*, 1870, No. 1). However, the conclusion *d priori* is probably justified, that if a few hours have elapsed since the ingestion of the phosphorus, and if fat victuals, moreover, have been eaten, and the stomach filled with them, sufficient time has been given for the absorption of the phosphorus, and the possibility of the oil of turpentine being still of use cannot be entertained. Here, however, so many individual differences, species, age, state of nutrition, disposition of the stomach, &c., will have influence, as to forbid the laying down of rules capable of general application.

5.—Far easier on the whole is the answer to the *fifth question*, as to

the doses and form in which the oil of turpentine should be given as an antidote against phosphorus. As the tables, to be communicated at a future time, evidently demonstrate, the comparative tests (No. 2) show that all the phosphorus is changed into terebinthino-phosphorous acid, if to 0·01 grm. (·15 gr.) of phosphorus, 1·0 grm. (15·5 gr.) of oil of turpentine, particularly the rectified commercial oil, be added. In other words, a hundred parts of oil of turpentine to one part of phosphorus. But for fresh or recently rectified oil, this assertion requires correction. For oil not rectified, or which has been rectified a long time, fifty parts are sufficient. In cases of poisoning, however, by phosphorus-paste, which is very rich in phosphorus, it would be advisable to exceed the dose of 10 grms. (155 gr.) of oil of turpentine, which even large rabbits bear without their constitution in general being essentially disturbed, and even it might be to raise the dose of the antidote to one approaching a toxical height. As to the form in which it should be administered, gelatine capsules containing 0·5 grms. (7·75 gr.), seem to be preferable to all others. An emulsion is absolutely to be rejected, on account of the accompanying fat or oil, which would assist the absorption of the phosphorus (Mialhe). The reason for the preference of the formula (by Vetter erroneously called "Andant's")—ol. terebinth. 10·0, mixt. gummos 180·0, syr. cort. aur. 20·0 grms., one table-spoonful every half-hour—over the gelatine capsules, is not intelligible. Within the gelatine capsules the bad taste of the oil is completely covered; the disagreeable eructation of the vapours of the turpentine, however, being inevitable. The spiritus æthereus, used as a vehicle by me at first, I shall no longer recommend, for since I have learned to understand the physiologico-chemical process of the effects of the oil of turpentine on the phosphorus, and of the ether in preventing the luminating of the phosphorus, I cannot any longer expect a good result from their combined use.

6.—Lastly, the solution of the *sixth question*, on what chemico-physiological processes are the antidotal effects of the oil of turpentine against phosphorus founded, has been sought, not by Jonas, as Bamberger incorrectly supposes, but by Perronne, and by the proof of experiments firstly made by me. Regarding the hypothesis of Perronne, who, as is well known, tried to demonstrate it by the argument of the pyrogallic acid, but by no means succeeded in making it even probable, I have to refer the reader to my first precursory communication, and to its criticism in Schimpff's dissertation,

only adding that it is founded on the observation that the luminating vapours of phosphorus are absent when in contact with oil of turpentine. Could this re-action in the stomach of the test-animals be prevented, it would be of very great toxicological importance; especially if it be allowed with Eulenburg and Landoir, that a penetrating of the vapours of phosphorus through the walls of the stomach to the surface of the liver takes place, and, as a consequence of this contact of the phosphorus vapour with the liver cells, a fatty degeneration or destruction of the cells. Both these hypotheses, however—of Perronne, and of Eulenburg and Landoir—must be set aside, on account of their insufficiency in argument; and we now return to the answering of the propounded question on the operation of the oil of turpentine in phosphorismus.

Observing the smell of the urine of two dogs, fed with phosphorus and oil of turpentine, (Exper. 16 and 17,) to be like the smell of opodeldoc or camphor, and this odour to get stronger still if the urine had been distilled, I (not Jonas, as Bamberger states) first arrived at the right explanation of this question. Oil of turpentine with muriatic acid producing the well-known turpentine-camphor, I concluded that probably the phosphorous and phosphoric acids, generated by the higher degrees of oxidation of phosphorus, would produce with the oil of turpentine an analogically constructed species of camphor; and that the urine of the test-animals (camphor itself being excreted through the kidney) derived its specific smell from the turpentine-camphor, resulting from the derivatives of the phosphorus. Furthermore, if the production of such camphor from the contact of phosphorus and oil of turpentine be pre-supposed, and if this camphor could be proved not to participate in the poisonous effects of the phosphorus, but to have the same effects on the organism as all other kinds of camphor, then it would at the same time be shown how the oil of turpentine operates as an antidote against phosphorus, and the ultimate aim of this discussion would be arrived at.

My object, therefore, was to find—

(1) Whether chemical combinations of phosphorus, and its pro-products of oxidation, were known; and if so,

(2) Whether they are produced by the contact of phosphorus and oil of turpentine under *all* circumstances.

(3) Whether they show toxical influences toward the animal organism or not.

(4) Whether they pass into the urine unchanged, and are to be found therein by chemical process.

(5) Whether chemical combinations of the derivatives of phosphorus and turpentine take place within the animal body.

(6) Whether the identity of the resulting extra- and intra-corporal chemical combinations can be proved in an exact manner.

Jonas had already briefly and incompletely described a cetaceum-like substance, as a chemical body, generated by the contact of phosphorus with oil of turpentine, but he had not analysed it. Such an analysis is very difficult, from the enormous tendency of the said substance to higher oxidations, as well in the free state as in combination with bases as a salt. (Why I have called this substance "Acidum terebinthino-phosphorosum" shall be stated further on.) Exposed to the light it cannot be kept, even in hermetically-closed glass tubes, without losing its crystalline structure, and thereby becoming amorphous and glutinous; put under the air-pump, or transferred into a current of hydrogen, (in this case explosive phospho-hydrogen gas resulting,) it cannot be dried, nor in any way obtained pure and properly prepared for combustion analysis. Freshly made salts, particularly the salt of baryta, are also destroyed by drying under the air-pump, where the light may influence them. More or less of the phosphorous acid, which is held in combination with the oil of turpentine derivative, always changes into phosphoric acid. By these means, the per-centage combination of course becomes so altered as to allow, in the numerous analyses about to be published, a variation of from 17·835 to 20·26. That the phosphorus causes this condition may be proved by treating the terebinthino-phosphorous salts, first with muriatic, and afterward with nitric acid. In the first case, the contained phosphorus is found as phosphoric acid; in the second as phosphorous acid: both the said quantities may then be weighed. The numbers so obtained differ. More or less of the phosphorous acid will have left the substance, and be changed into phosphoric acid. As a result of a baryta process instituted some time ago, I determined the formula of the terebinthino-phosphorous acid to be $C_{10}\ H_{15}$ TO, not quite exact though, from an inevitable admixture of more or less phosphoric acid, and some resinous, glutinous oil of turpentine derivative. The terebinthino-phosphorous acid, recently prepared, crystallized, white, and smelling peculiarly like camphor, is

soluble in alcohol, ether, benzine, petroleum, and in solutions of acids and alkalies; atmospheric oxygen, however, oxidizes it to a red, resinous, glutinous substance, containing free phosphoric acid. To vegetable colours it gives an acid re-action. As regards metallic salts, its power of separating silver out of the salts of silver, and calomel out of corrosive sublimate, is to be remarked, proving thereby its deoxidizing powers. The precipitates of the salts of lead, copper, baryta, &c., with the exception of the copper precipitate, are not soluble in boiling water, even if acetic acid be added. From acid and alkaline solutions, terebinthino-phosphorous acid, together with water vapours, may be distilled, and it may always be produced by oil of turpentine containing oxygen, being brought into contact with phosphorus; most rapidly by shaking the mixture well after the melting of the phosphorus. A good formula for its preparation on a larger scale I have already given in my first preliminary communication. In doses of several grammes, the terebinthino-phosphorous acid is harmless to dogs, and therefore inoffensive in comparison to phosphorus; but it is not to be denied that it may possibly possess toxical properties in the same measure as other species of camphor.

Taken by the mouth, it travels unchanged through the body, and is eliminated in the urine. The urine, distilled and rendered alkaline by ammonium carbonate, contains the same substance, smelling like opodeldoc, and containing phosphorus. (*No other product of distillation of urine, under any other conditions, will contain phosphorus.*) That substance produces exactly the same re-actions as the solution of the terebinthino-phosphorous acid itself, reducing the solutions of the salts of silver and corrosive sublimate, &c. The generation of this acid also, by the contact of phosphorus and oil of turpentine in the stomach, is proved by the similar condition of the distilled contents, but the distillate has an acid re-action (not like the urine, alkaline). Further, oil of turpentine and phosphorus having met in the stomach, urine of the same quality results as if terebinthino-phosphorous acid had been given, *i.e.*, a product of distillation, showing all the re-actions just detailed, and containing phosphorus. The experiments demonstrating this will be fully detailed in the work I am about to publish.

There can hardly be a doubt raised now, either as to the production of the terebinthino-phosphorous acid by the combination of oil of turpentine and phosphorus in the stomach, or as to the generation of terebinthino-phosphorous acid, as I have called it, inasmuch as it

has comparatively little toxical properties, being the cause of the antidotal effects of the oil of turpentine in cases of acute poisoning with phosphorus.

For these reasons, also, Perronne is in error in supposing that oil of turpentine prevents the oxidation of phosphorus ; on the contrary, by the assistance of the oil of turpentine, the phosphorus becomes, in fact, oxidized to phosphorous acid, and afterward higher still. The oxygen, in this process, however, is furnished, not by the blood, but by the oil of turpentine given as the antidote.

ON THE CHARACTERISTIC PROPERTIES OF OZONE: ITS MODE OF GENERATION, AND THE PROBABLE INFLUENCE OF ELECTRICITY UPON THE OTHER GASEOUS BODIES.

By Ferdinand E. Jencken, M.D., M.R.C.P. Lond.

In bringing a subject of a purely chemical nature before the notice of this Association, I do so with the more diffidence, as, owing to the few opportunities I have had of working in the laboratory, my acquaintance with the practical department of chemistry is unfortunately but very slight. Nevertheless, animated by the great love I have always felt for that marvellous science of mysterious combinations and affinities (although it never formed a prominent part of my studies), I have striven, as much as lay in my power, to render myself familiar with its leading authors, and have watched every new discovery, as it successively arose, with the liveliest interest, not only as affording a fresh contribution to the splendid array of facts which we already possess, but as opening, by the new ideas they each awaken, a wider field for practical experiment and philosophic research.

We are told that when oxygen is submitted to a current of silent electricity it gradually becomes changed in its nature, being condensed in volume, emitting a peculiar odour, and exhibiting a great affinity for certain substances, by which it is greedily absorbed; in short, it is converted into what is technically called Ozone, a very small proportion of oxygen only being subject to this change. This proves the power electricity possesses of modifying the condition of the more diffusible elements, whose feeble plasticity renders them exceedingly prone to be swayed to and fro, and even altered in character, by the presence of any extraneous influence calculated to hasten their transition to the more stable bodies, as seen in Faraday's beautiful experiments, in which a ray of light was made to assume different colours by a parallel current of electricity being alternately passed on either side of the same; and also distinctly

demonstrates the duality of atom, not existing side by side, as the mere repetition of the same molecule, firmly bound together by the power of mutual attraction, but being identical with ultimate points of force, and capable of exhibiting opposite principles, the negative and positive, the attractive and repulsive, the central and peripheral. Thus matter and power are indelibly united: the one representing the formative principle, and gravitating towards arrest; the other signifying motion, and being synonymous with development.

Hitherto this duality of chemical equivalence has been recognised as appertaining to oxygen alone, according to the researches of many distinguished chemists; but reasoning from analogy, we are scarcely justified in restricting this property to any one body in particular, but, on the contrary, are forced to the conclusion that it is held in common by all matter; every substance, irrespective of its relative position or individual character, being capable, in its ultimate atoms, of exhibiting the same twofold principle, as enunciated above, assuming two opposite states, in accordance with the universal law of polarity. Thus, if this axiom be true, not only oxygen, but all the gaseous bodies must, in the same degree, be liable to be acted upon by electricity—*i.e.*, be capable of ozonization—each undergoing changes similar to oxygen when subject to the operation of the same cause. Let us, for example, take hydrogen, which, from being a simple element, familiar to all, and diametrically opposed in its nature to oxygen, is best calculated to serve as an illustration.

A current of electricity, when brought to bear upon this highly expansile body, must have the same effect in modifying its nature as it has in altering the characteristic properties of oxygen; in short, be capable, so to speak, of converting a portion of the former into a species of ozone. Thus changed in its nature, the action of hydrogen must also, in some degree, have undergone modification; so that, when brought together with oxygen under an eudiometer, and exploded by an electric spark, both being in a state of ozonization, a product might be obtained, differing in character and composition from the mere aqueous fluid otherwise resulting from such a process.

What the exact properties of such a compound might be, can, of course, only be determined by repeated experiment; but thus much is certain, that if this prove successful, a wide field for future chemical investigation lies open, which, if carefully worked, may lead to discoveries of the utmost importance, and may perhaps

assist in throwing some additional light upon many a dubious question that has as yet remained unsolved.

All changes, however material they may appear to the outward eye, are in truth the work of invisible agents; or, in other words, no physical action, gross though it may be, can take place unless by the intervention of a dynamic principle, which, in reality, is the moving spring of the entire phenomenal world. What, then, are dynamic operations? Are they merely the result of an alteration in the relative condition and attraction of forces without the least form or materiality, or are they carried on through the medium of a highly refined fluid, too subtle to be appreciated by our grosser senses?

Decidedly the latter; and here we arrive at a most important point in natural philosophy, the pivot upon which all the operations of the so-called imponderable elements may be said to revolve.

When we speak of force in the abstract, we merely signify motion in any given direction, wholly indifferent as to its mode or rate of progress; but as no striving or progress can be supposed without a simultaneous resistance induced from without, we are obliged to admit a series of interruptions in its course which, occasioning an accumulation *a tergo*, gives rise to a temporary junction of potential moments; this centralization of force, in opposition to its peripheral tendency, being the first origin of matter.

Matter and power, it will thus be seen, though evenly divided, do not always exist in an even ratio, a preponderance on the one or the other side being constantly observable, producing that vigour of action between the two antagonistic states, out of which the beauteous reality of the creation is woven, imperfect in itself, yet ever approaching perfection, by being imbued with that principle of development by which the minutest atom, quitting the unconscious creation, is elevated from grade to grade to the highest spheres of intellectual and spiritual life.

But without dwelling too long upon the metaphysics of ultimate causes and effects, which at best must and will always remain a matter of speculation, we at once enter upon the more palpable phenomena evinced by the multifold fluctuations of the so-called formative and volatile elements, such as electricity for instance; which, whatever its sources and peculiarities, is not an unincorporated force, a something unattached to the tangible world, but which, like its correlatives, light and heat, possesses a decided materiality, its investing fluid being, in rarity and

volatility, comparable to the cosmic ether, subject however, like the Odic element, with which it is synonymous, to endless changes and phenomenal deviations, varying in kind and degree according to the character of the individual body from which it may happen to have been derived. Hence the intimate relations that exist between all the diffusible elements, and the power of substitution enjoyed by some; electricity, galvanism, and magnetism, nay, even light and heat, constituting so many groups of the same family. It must not, however, be supposed that electricity, like its kindred fluids, galvanism and magnetism, is in any way permanent in its action; so far from this, its broad elementary properties render it too general in character to have any more than a transient effect; yet, despite this, there are certain virtues with which it may be said to be identified, and which, from the particular manner in which they act, cannot be altogether passed over in silence: I allude to its catalytic and synthetic powers when used as a chemical re-agent, and to the condensing effect it has when brought into contact with the more diffusible elements. This latter attribute is manifested in various ways: as in the depression of temperature that follows upon a thunderstorm; the extreme cold that ensues after a brilliant display, or upon a prolonged duration of, the aurora borealis, as occurs in arctic regions; in the phosphorescent smell emitted in places struck by lightning; in the colouration of a white luminous ray submitted to its influence; and finally, in the increased specific gravity assumed by ozone when separated from neutral oxygen,—a property well understood by practical chemists.

Thus electricity may, from the manner of its behaviour, be looked upon as a strong chemical re-agent, possessing, like light, heat, cold, &c., an indisputable power of altering the molecular arrangement of matter, and of inducing it constantly to enter upon new forms and fresh combinations.

I extract a somewhat lengthy passage from M. Cahour's *Traité Elémentaire de Chimie*, as conveying, in general terms, the most recent observations on this no less important than extensive subject. "A profound study of the elements has demonstrated the possibility of producing in some of them, under purely physical influences, molecular modifications, capable of instituting very considerable changes in their properties. Thus, sulphur and phosphorus, subjected to the action of certain temperatures, acquire new and very different characteristics from those we are familiar with in their ordinary state; chlorine, in like manner, under the

influence of prolonged insulation, undergoes modifications tending to exalt its combustible properties. Electricity, as well as light and heat, induces remarkable changes in the elements; thus oxygen, when traversed by numerous electric sparks or those obtained by electrolysis, possesses more active properties than those obtained by the distillation of chlorate of potash or peroxide of manganese."

The unpleasant and peculiar odour which prevails during a thunderstorm, in neighbourhoods struck by lightning, has long been noticed.

This odour, analogous to that emitted by phosphorus when slowly oxidized by the air, is also observed, but in a lesser degree, during the discharge of a powerful electric battery; it is equally produced when electricity is disengaged in the form of luminous sheaves, by means of a metallic point placed in communication with the conductor of a powerful friction machine. The cause of this odour is altogether of a material kind; Schœnbein, who first drew attention to this phenomenon, attributed it to the presence of a particular element of the class termed Halogens, to which he gave the name Ozone.

It is now perfectly established from the experiments of MM. Marignac and Fremy, that the ozone of Schœnbein is a simple allotropic modification of oxygen produced by the influence of electricity, similar to that imparted to phosphorus by heat. Oxygen is also presented in this form, when separated from one of its combinations at a low temperature; when the oxide of barium, as recognised by M. Houzeau, is treated with diluted sulphuric acid (*acide sulfurique étendu*). Again, ozone is produced chemically, by slowly oxidizing phosphorus, at an ordinary temperature; that portion of the oxygen which does not enter into combination presenting all the properties of that obtained in the nascent state or ozonized oxygen.

Ozonized oxygen, whatever be its origin, is found in a peculiar state of chemical activity, in virtue of which it becomes capable of contracting certain combinations, or of producing decompositions which it is unable to bring about under its ordinary form. It is thus that, similarly to chlorine, bromine, and iodine, it acquires the property of rapidly destroying all colouring matter of an organic nature. It is greedily absorbed by mercury, and unites with silver, on the surface of which it forms a blackish layer of oxide; most of the metals which only oxidize with difficulty, similarly absorb

ozonized oxygen, under conditions where inodorous oxygen would remain altogether inoperative.

In the presence of water, ozonized oxygen directly combines with chlorine, bromine, and iodine, which it transforms into acids. Under the influence of an energetic base, it quickly and immediately unites with azote, forming ozonates. When an aqueous solution of ammonia is allowed to fall drop by drop into a phial containing ozonized oxygen, abundant white fumes are at once given off, furnishing upon the evaporation of the fluid beautiful crystals of the ozonate of ammonia.*

It follows from the foregoing that every cosmic free power, whatever might have been its origin or mode of liberation, may, by an incidental arrest and accumulation of its waves into one centre, assume an electric character, exhibiting, but upon an enlarged scale, the same physical attributes as when artificially induced.

All bodies, therefore, whether gaseous or solid, may in their turn become electro-genetic, and this property being conceded to matter in general, the countless worlds that spangle the skies teeming with organic life, must, like this sublunary planet, be vast repositories of electric and magnetic forces, from which the grosser telluric elements are ever and anon produced.

Hydrogen and carbon may be said to represent these in the gaseous form, whilst the solar gas comes to us in the shape of oxygen; nitrogen belonging to the animal kingdom.

The union among these four is endless; but if the two first named gases, including azote, are active as terrestrial and organic elements, oxygen is no less so, as the solar principle, which, entering into combination with all matter, whether dead or living, effects a physical union between the earth and sun, converting the entire globe, with all it contains, into a vast oxide, whilst every vital action may, chemically speaking, be said to be due to a perpetual process of oxidation; under the vivifying influence of which, animal heat, the reddening of the blood, muscular motion, and in short the renewal of all tissues, whether animal or vegetable, are principally effected.

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* This latter observation is so far of importance as it tallies with the experiment made with ammonia and hydrochloric acid fumes, in which chloride of ammonium is precipitated as a dense white powder, showing the affinity between ozonized oxygen and chlorine, and the rapidity with which, under favourable circumstances, the gaseous bodies may be made to pass into the solid state.

What wonder then, that when the plutonic period of the earth had subsided, and another era in geology had ensued, a more intimate union between the solar and terrestrial gases should have taken place, especially with reference to hydrogen, which, being brought into contact with its opposite, oxygen, was, by the powerful emanation and explosion of the earth's electricity, (a phenomenon so frequent in antediluvian times,) in all probability converted into water; that powerful medium, in which all incipient organic life is fostered and generated; and which, overspreading the earth with its genial influence, contributed more than aught else to change the aspect of its surface, transforming it through all succeeding ages from a mere barren rock, to the beauteous creation we now behold. As maintained by astronomers, the earth, like the moon, in its beginning was probably without an atmosphere, the air we now breathe being of later date and concomitant with the first appearance of organic life, whilst the formation of water must in pursuance of the foregoing theory have been both spontaneous and of a much earlier age, first appearing as a mere nebulous exhalation, shrouding the face of the earth, then vomited up in conjunction with molten lava and debris of heated rock, by the convulsive efforts of volcanic eruptions; the extinct craters subsequently forming lakes with steep and rugged boundaries, or quietly settling down in solitary hollows, till at length, after many deluges of stupendous proportions, the land was separated from the waters, and the mighty ocean confined to its natural bed.

Constituted as the earth is now, the spontaneous generation of the elements and their combination amongst each other, is neither so sudden nor so violent as must have been the case in former ages, an elementary supply between the three kingdoms, continuing in an uninterrupted chain: the animal yielding nitrogen; the vegetable, carbon and oxygen; the seas and rivers, their vapours; which rising up into the clouds, again find their way down to gladden the earth with refreshing rain, each element being destined to travel in a regular cycle, to recommence its course at the point from which it started.

Yet to recognise a constant interchange of the same forces, without possessing the least power of renovation, would be tantamount to implying a stagnation in the supply, and thus by denying, even in a single instance, the principles of gradative evolution and reproduction to subvert two fundamental laws of the creation.

An everlasting genesis, therefore, of things created, must infallibly take place at all times and at every point of the universe, and if we once concede this attribute, as pertaining to the creation in general, we must also admit its applicability to the earth and its products in particular; thus whilst we frankly acknowledge the reciprocal action of the several elements, and their continual interchange amongst each other, we are bound to maintain their inherent power of self renewal, aided by an eternal influx of countless forces from without. The aqueous element, that great and general vehicle, in which formerly all mineral matter was suspended, in course of ages to settle down and consolidate into the stratified formations, that genial medium, from which ever and anon the living creation arose, as it unfolded from the simplest cell to the most complex organism, must in consequence, as in the earliest periods of the earth's history, still be capable of spontaneous generation, though not in the same measure as before. And this is the more likely, as the deep-seated springs, removed as they are from all surface drainage, cannot in reason be supposed to derive their supply from a mere process of distillation and hydraulic pressure, their delicious freshness and copious yield pointing to hidden sources of reproduction, of which as yet we have no positive clue.

But of all the phenomena that strike the understanding, the most astounding is the volume and unfathomable depth of the ocean; the rills and rivers, however vast and numerous, that mingle with the tide, being wholly inadequate to swell its waters to the immeasurable bulk it now presents. The ocean must therefore to a great extent, like the deep waters of the earth, derive the magnitude of its volume from a free interchange of unbound telluric forces, which, acting upon the different gases liberated in the deep, convert the oxygen and hydrogen, as they meet, from the gaseous to the fluid state, thus largely helping to produce that permanent supply of water, sufficient in itself to maintain the sea at its proper level, and fully adequate, together with whatever assistance it derives from auxiliary sources, to provide against loss from evaporation, or the waste incurred from less important causes. But to proceed, all vegetation, water being the fostering element of every organic life, must primarily have been of marine origin; the fucoid and algoid species with which the ocean then abounded being, like the primeval ferns and palms, not only different in kind and form to the families of the present creation, but attaining, in obedience to laws now extinct, to sizes of

inconceivable proportion, a phenomenon only to be understood upon the principle, that no higher species being set against them, as their natural barrier, their further growth remained unchecked.

But not only the vegetable, but also the animal creation, was aquatic in its beginning, as shown by the molluscan genera, with which the secondary and tertiary periods are pervaded; we merely allude to the shale-lime, in illustration of the prodigious extent to which the multiplication of even a single species was carried in those days. Imbued with vegetable and animal life as the ocean thus became, it need occasion no surprise that, as time advanced, the waters became saturated with their respective characters; their constituent parts being gradually taken up and assimilated by this great solvent, which chiefly disintegrated the chlorine and soda found in all marine vegetation, these going, in a great measure, to form the chloride of sodium, or, in other words, the brine of the sea, an ingredient by which it is at once distinguished from all other waters of the earth. That some such process must evidently have occurred, appears from the extensive beds of native salt found in various parts of the globe, probably the residue of capacious lakes now extinct; further, the abundance in which this material must formerly have existed, is proved by the fact of its being found in deep and spacious caverns, the saturated water as it percolated through the above-lying strata immediately crystallizing into stalactitic forms. It is obvious therefore that the salt of the ocean, so far from being acquired from extraneous sources, must rather be regarded as an inherent part of the same, produced by natural causes; the theory generally propounded, that this ingredient is principally derived from the minute quantum of salt contained in the multitudinous rills and rivers that find their way into the sea, there to add their mite to the already existing store, being altogether too puerile to account for the magnitude of the phenomenon in question.

But without wishing to enter into the wise provision made by the Almighty in furnishing the ocean with a material, capable by its antiseptic character of resisting the decomposition to which so large a body of water, without vent or apparent renewal, would in process of time become liable, or desiring to discuss in detail the several uses that have been ascribed to this remarkable compound, we abandon these inquiries as irrelevant to our subject, and merely bestowing a cursory glance upon its physical and chemical charac-

ters, we at once hasten to consider the question in its purely philosophical aspect.

We have endeavoured to show that water, in its first origin, must have been the result of the junction of the telluric and solar principles, which, meeting physically in the shape of two gaseous bodies, combined to form the aqueous element by which at present two-thirds of the earth are covered; that this medium, growing in volume and extent, became the mother of the living creation, both vegetable and animal; and that, in course of time and by a catalytic action, the ocean not only became saturated with salt, but that, in consequence of its solvent and dissevering powers upon all things dead and living, it to a certain extent became imbued with an organic alloy, thus gradually and by a natural process departing from the purely neutral character of which it must primitively have been possessed. We also maintained that the genesis of the aqueous element had not merely been confined to the primeval periods of the earth; but that the spontaneous production of water must still be in operation, probably owing to the continual emanation of a free terrestrial force, which, acting upon the liberated gases, under favourable circumstances, and somewhat in the way of an electrolysis, even at the present time gives rise to the phenomenon in question. Again, when speaking of the action of electricity, we considerably enlarged upon the singular property it possesses of altering the molecular arrangement of the more volatile elements, as exhibited by the allotropic condition assumed by neutral oxygen when under its immediate influence; and lastly, as expletive to the argument at issue, we touched upon the disjunctive power it exercised, either by an explosive spark or a silent current, over most bodies, gaseous or solid, no matter whether accidentally brought together, or however firmly united by the force of chemical and physical laws.

Now if we retrace our steps back to the earliest records of geology, we find that during an incalculable period of time, water was the predominant element on the surface of the earth, and that only, in course of time, either by successive volcanic eruptions or perhaps by the laws of growth, from which even our planet is not exempt, the dry land began to separate from the deep; the mountain tops appearing first, whilst the plains and valleys were only slowly uncovered, as the ocean gradually receded and settled within its prescribed limits. The dry land, therefore, as it unfolded in all its natural beauty, and became the genial soil for the

development of a more perfect creation, must have attained to a higher position in the earth's formation, than those parts of the globe still overlain with water, and unable by their natural efforts to rise over and vanquish this overwhelming and mighty element. Hence, the ocean, as resting upon the less developed portion of the earth's surface, should possess a greater redundance of free telluric force than appertains to the dry land, where so much terrestrial power is not only locked up in the solid mass, but has from the earliest ages been so abundantly employed in raising the continent to the level it now occupies. In short, the entire sea may, either alone or aided by the friction of its waves, be considered in the light of a great electric storehouse, and so true is this comparison, that with regard to submarine telegraphy it is said that the electric power increases in proportion to the length of the cable told out, whilst in overland telegraphy its force perceptibly decreases in accordance to the distance it travels, so that various plans have been contrived, with the object of forestalling the loss it sustains on its way, and renewing the supply of the exhausted fluid.*

If such be the case, and it be further proved that the ocean represents a vast repository of free telluric forces, and that moreover these, upon the slightest incentive offered from without, are immemediately ready to assume an electric character, it is easy to conceive, as previously alleged, how, under favourable circumstances, the telluric currents, by which the great seas are perpetually traversed, may not merely become water-producing agents, but how, upon an extension of the process, a portion of unemployed oxygen may be made to depart from its normal type and be converted into ozone, as under a purely electric current. But to recapitulate, the electric fluid, far from being restricted in its operations, must, from its peculiarly expansile nature, extend its influence over a wide radius, and act in a manner much more penetrating than any of the less subtle elements with which it is akin, modifying each, according to the difference that exists in their physical and chemical properties, even to the sphere of organic life. It is there-

* It even becomes a question whether in submarine telegraphy, upon having previously buried the negative poles, it might not be sufficient to to lay a short distance of cabling from the shore of either side, simply taking care that the free ends be exactly opposite each to each; the electric current thus conducted into a given path, would in all probability form its own circuit as completely as though the cable had been laid the whole length.

fore not beyond the range of the possible that the nitrogenous element, as it exists in the vegetable and animal tissues, may, under the catalytic influence of electricity, be compelled to depart from its normal type, and in some measure take on an allotropic condition, under which divided shape, when uniting with its analogue ozone, it may eventually form a new compound, (chlorine,) occupying an independent position in chemistry, and possessing, despite its two-fold nature, all the properties of an irreducible element.

Whether this singular junction takes place within the confines of the living economy, or whether upon the liberation of azote a combination like it is effected in the ocean at large, or whether part of these assumptions be true, is, at the present stage of our knowledge, impossible to determine: but certain it is that chlorine, from its peculiar odour, its bleaching and its disinfecting properties, the power it has of supporting combustion, the comparative feebleness with which it holds its oxygen when combined with it as an acid, and the readiness with which it unites with all alkaline and metallic bodies, must, like ethyl, methyl, formyl, ammonium, cyanogen, and other organic bases too numerous to be mentioned here, be regarded not as a simple but as a complex body; in short, as an ozonite of azote, $oz+n$, or, in the phraseology of the Haloid theory, as an azoto-ozonic acid, N^{oz}; with this difference, however, that instead of being capable of resolution into its constituent elements, it has till now strenuously withstood the united efforts of chemical and electric analysis.

What has been advanced with reference to chlorine may, in a modified sense, be said to apply to its analogous bodies, iodine and bromine, only that, from their physical characters, they appertain more to the organic realm, whilst boron, fluorine, and silicon have a decided leaning to the mineral kingdom. Doubtless, light, heat, cold, moisture, friction, and, above all, chemical affinity, are powerful engines for the disjunction and reunion of elementary bodies, and daily experience emphatically testifies to their potency in this respect. But, great as is their power, they are, as regards delicacy and energy of operation, far inferior in their action to electricity, which, from its rare and diffusible character, its ready and rapid accumulation, together with its sudden explosion, its correlation to the cosmic ether and to other elements of an equally transitive nature, and, above all, from the intensity and subtleness with which it acts, may be reckoned among one of the most penetrating catalytics of which we are in possession.

Bearing this fact in mind, and encouraged by the marked success that followed the experiments recently performed by Schœnbein and Marignac, we should not rest satisfied with a single result; but extend our investigations, by causing the electric current to be equally directed against the other gaseous bodies, with the special object of determining how far they may be induced to divide, and, like oxygen, to assume an allotropic condition.*

Such a series of experiments, conducted with a strictly scientific aim, might eventually lead to the most important issues, and might particularly, to revert to the question of chlorine, contribute to to afford the desired clue to the query whether it be a complex body, and if so, what are its affinities to the organic world, and what the exact mode of its generation. Though it may be convenient for practical purposes to regard all chemical elements as irreducible bodies, no states, either of matter or power, are so wedded to the same form, as not, under peculiar circumstances, to be subject to a

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* Since writing the above, I have been given to understand that experiments, similar to those suggested, have actually been performed upon several of the gaseous bodies, as sulphurous acid, nitrogen, and hydrogen; but unfortunately with no result, save perhaps, as in the case of the latter, to intensify its action when brought into contact with bodies with which it ordinarily unites. But when we reflect that a certain capability of condensation is required on the part of the body acted upon, before it can undergo a division, the lightness and expansibility of hydrogen, as well as the negative properties of nitrogen, are in themselves a sufficient reason to render any experiment of the kind abortive; to say nothing of the basic character of hydrogen, which, like all bodies of a metallic order, operating as a conductor of electricity, prevents that condition of full repose so favourable to all chemical and physical action. I would, therefore, with the object of meeting this difficulty, propose to prepare the particular gas to be experimented upon for the condensation it will have to undergo, by first submitting it to a low temperature, as in solidifying carbonic acid gas, or bringing it under several atmospheric pressures, or subjecting it to both processes at once, which, interfering with its atomic cohesion, might, in conjunction with the catalytic power of electricity, induce it to take on the allotropic condition it refused to assume before.

In acting upon nitrogen the fault lay in employing atmospheric air, instead of the pure gas, the obedience of oxygen to the electric current being too strong to admit of any other gas, in a state of mixture, to be modified by its influence.

Of the compound gases, like sulphurous acid, &c., subject as they are to a plurality of laws, our prognostications can only be problematic, though the first effect of catalysis would probably be to resolve them into their constituent elements.

physical or molecular change, which, if we fail to detect by direct experiment, must either be ascribed to chance not having favoured our observations, or rather to the imperfect means of investigation under our command.

Whether we look upon time and space as innate ideas, or whether they be regarded as notions subsequently acquired by the force of reason and observation, it is an incontrovertible truth, that, whatever be the abstract form imparted to them by the mind, they are in their extension upon the objects of the outer world capable of infinite diversity and modification. We have a practical example of this in the exact sciences, every variety of form, number, and proportion ranging within the possibility of conception; the triangle and circle as arbitrary forms, and upon which all ocular demonstration depends, serving as a standard in mathematical reasoning, whilst the unit, as an assumed halt in an infinite series of progression, like equation, proportion, and approximation are the points to which all arithmetical calculation may be reduced, yet with the utmost freedom of application. The same holds good in the real world, matter and power being subject to every conceivable change, in its physical condition, as in its molecular arrangement, both in respect to the narrow limits of this earth and the countless spheres beyond. Grove, when speaking of the nature of the correlative forces, particularly alludes to this, arguing with great acumen that phenomenal worlds must and do exist, wider in extent and under the governance of different laws to ours, worlds of which, in the present state of our knowledge, and from our own imperfect ideas, we can have no adequate conception. But though it cannot be denied that the principle of infinite modification operates equally in the universe in general, as in every integral part of the creation, it is particularly apparent in chemistry, as in all the physical sciences, where, from the multiplicity of polar and proximative affinities, the conservation of forces, and the transitive nature of the diffusible elements, an everlasting interchange of dynamic and material relations obtains, resulting, as a necessary consequence, in an endless substitution of form.

Hence, we must admit it as a general axiom, that, no matter however irreducible a body may appear in a chemical point of view, its present condition can never be regarded as so permanent, as not, under a peculiar coincidence of circumstances, to be made to depart from its adopted type; nor can we accept any relationship or capacity of combination as so absolute in its demands, as

not occasionally to be subject to the dominion of subordinate rules by which its own laws are kept temporarily in abeyance, as may be repeatedly seen in organic chemistry, where mercury, for instance, when treated with bodies of the aldehyde series, from being a diad becomes a tetrad, and many more examples of the kind, upon the consideration of which we cannot at present enter.

We should, therefore, in the pursuit of science carefully guard against the too rigid adoption of set rules and formularies, which, however useful they may be in facilitating the solution of difficult problems, or bringing abstruse questions under the cognizance of the understanding, must ever tend to foster a more than legitimate reverence for authority and traditional lore, which, invaluable though they may be in serving as intellectual guides, have, when too implicitly cherished, ever proved the greatest barrier to the advancement of learning and enterprise of thought.

CASE OF OBSCURE CEREBRAL DISEASE IN A CHILD, WITH REMARKS.

By W. H. Day, M.D., Physician to the Samaritan Free Hospital for Women and Children.

The details of the following case are rendered imperfect in a diagnostic sense, by the stationary condition into which the little patient has passed. A subsidence of the more active symptoms has not revealed the obscurity that hangs about it, nor thrown a clear light on the nature of the affection. As the case wears on from day to day with so little change and variation, my conversion to the faith, that debility, followed by a long and tedious bronchial attack, invited the ugly symptoms that ensued, is in a great measure borne out by the fact, that the patient's state at this advanced period is best described by the same term now. No recognised disease of the brain or its membranes clearly defines the disease whatever it may be.

May we not call debility a disease in itself, and is it not the forerunner of nearly all its recognised forms? Is it of no moment then to say, that we are only dealing with debility? Debility will not always consist of mere exhaustion of the vital powers, a break-down sooner or later follows, and the machinery gives way in some part. The danger of the condition is, that it calls into active form a diathesis or particular disease which might otherwise have slumbered for an indefinite time, or passed away, or not arisen at all. Let us look this debility sternly in the face, and we shall often interpret the true cause of failing cardiac power; the check to mental vigour, and a whole train of abdominal and thoracic affections which have followed it.

L. M., æt. two and a half years, a pale and fair child, with light hair, and gray eyes. His mother is weakly, and his grand-parents on the mother's side both suffer from asthma, and

are very nervous people. He has from his birth been more or less delicate, but has had no decided illness, beyond some occasional difficulty in dentition, till seized with a troublesome attack of laryngeal and tracheal irritation in January, 1871. This illness was acute, and threatened to assume the nature and severity of croup. He was confined entirely to the house for weeks, and for some weeks to an apartment where the temperature was maintained as nearly as possible at 65°. During this time he was fretful, languid, and pale, occasionally feverish in the evening, and we were compelled to resort to a grain of calomel on more than one occasion. His bowels were inclined to be sluggish, but a soap and water enema or some stewed prunes answered well. At this time he would cry when any one entered the apartment where he lay; he was restless in his sleep, his breath was often offensive, and he would grind his teeth; no worms had at any time been noticed. His diet consisted of milk and lime-water, beef-tea, chicken broth, thin arrowroot. On the 28th of April, I tried him with cod liver oil, which made him sick. The vinum ferri did not agree. I now tried him with tincture of bark and carbonate of ammonia, and this seemed to suit him.

At the beginning of May, 1871, he had not thriven satisfactorily, although for a month previously he had lost all tracheal irritation. He was now thin, languid, and fretful; his skin was loose and his muscles flaccid, and he had been sick without any satisfactory reason. The sickness seemed to be accidental, but as the child put his hands to his eyes, and more particularly to the right side of his head, I was not without some anxiety. The belly was soft and free from tenderness and pain, the skin was cool, and the pulse small and quiet. The pupils were of medium size, and uniformly acted well under light. Dr. West saw him, and said he could not understand whether he suffered pain or not. We were rather inclined to regard the symptom as ear-ache, but when no discharge came on, and there was nothing to be discovered in the ear, we gave up this view of the case. On the 8th of May, as he did not get on well, he went to Brighton for fourteen days, where he fell under the care of Dr. Henry Moon. On the day he left, I freely scarified his gums—he had sixteen teeth. The keen winds set up some fresh bronchial irritation. Dr. Moon thought that the undefined pain in the head might arise from reflex dental irritation.

24th.—Has been sick during the night, and cries out with pain in the head, referring the situation of it to the eyes, which look

dull and heavy. He is very fretful, and cries constantly; the skin and temperature are normal; the pulse is regular, but small and weak. He has vomited no bile, simply his food. His condition is certainly worse than it was a fortnight ago. There is a slight difference in the breathing of the two lungs. Below the right clavicle in front, and the spine of the scapula posteriorly, the respiration is somewhat harsh, with an occasional crackle, but both lungs expand well, and the percussion sound is everywhere resonant.* Dr. West saw him again, and thought his state decidedly worse. He suggested hydrate of chloral at bed-time, and bromide and iodide of potassium with glycerine and tincture of quinia three times a day.

On the following day, May 25th, he had slept from the medicine, but was very fretful and crying most of the day, and repeatedly raising his hand to his head.

26th.—After taking chloral last evening, he was sick, but slept well notwithstanding. He eat greedily of bread and butter, and was lively through the day.

27th.—Slept four hours after taking the chloral; was restless and fidgetty during the greater part of the night; he knits his brows and looks pale and exhausted, but has not been sick or cried from pain in the head. He takes veal broth, which seems to agree with him.

29th. (Two days later).—The report states that he has had a good deal of pain to-day. He is knitting his brows, grinding his teeth, and sighing a good deal. The symptoms appear very ominous of either actual or threatening tubercular deposit in the meninges. He is ravenous for food. Temp. 98°. Sir W. Jenner saw him, and thought most unfavourably of the case. He advised a continuance of the diet, as being nourishing and non-stimulating, and a mixture of citrate of potash and iodide of potassium, with a few drops of sal volatile, three times a day.

On the 31st, I made the following note. Sometimes he is very lively and greedy for food, at other times he is completely prostrate, knitting his brows, and crying out with pain for three hours together; the attacks of pain usually last two hours, and generally occur in the morning and evening, rarely in the middle of the day. Pulse 112, small.

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* I could not avoid fearing that there was danger of tubercular deposit in the lungs and meninges. The great debility makes it very suspicious that there is some latent tuberculosis. We have to fear this, for debility of long standing in young children does not remain as mere debility—some disease succeeds it either in the chest, abdomen, or brain.

June 7th.—For three days he has been perfectly free from pain and sickness, and seemed more himself, but at ten p.m., having had a slight cold through the day from the prevalence of east winds, he became deadly pale, was exceedingly sick and prostrate, and the pulse too rapid to be counted. On the following day the tongue was covered with a thick white fur, the skin was damp, and the pulse 120 ; he was exhausted by the slightest fatigue, and lay as if lifeless in the nurse's lap. There is some bronchial irritation, the right side of the chest being most affected.

10th.—He awoke from his sleep very pallid and profusely sweating, the cough was troublesome, but there was no sighing or grinding of the teeth.

13th.—Sir William Jenner saw him again, and we agreed to give him half a pint of ass's milk night and morning. Sir William Jenner advised that he should have minced meat with gravy and potato passed through a sieve, and the following day beef tea. Also thirty minims of the syr. ferri phosp. comp. in water twice a day, after food. Sir William Jenner also suggested one or two tea-spoonfuls of porter sweetened with sugar, to be given after the mid-day meal.

20th.—No improvement. The sickness and pain in the head have been more frequent, and he has brought up nearly all the food he has taken, even ass's milk. Last evening he fainted away after the use of an enema, and on recovery rolled his eyes vacantly about, and had a squinting look expressive of cerebral trouble. An hour later the skin was damp. The pulse averaged 75 beats a minute, and was occasionally irregular from the feeble contractile power of the heart. There is great fluctuation of the pulse in force and frequency. The steel and porter have not been attempted. Now and then the solid food seems to agree, and he takes a little brandy and water.

21st.—Clear turtle soup was given him, which the stomach retained, and five minims of brandy after it in water.

23rd.—Has now been squinting for three days. At two p.m. he was cold and collapsed, very pallid, and scarcely making any effort to swallow when some brandy and water was put into his mouth. He could not recognise any one about him. It seemed certain that there existed some intracranial deposit.

25th.—He recognised every one around him. He has taken one pint of turtle soup in *two* days, in addition to the calf's-foot jelly and wine, and six minims of the spt. amm. arom. every four hours. During the digestion of such a meal the pulse will rise

from 70 to 120 ; he is roused to take food, and then falls to sleep soundly again. If food were not regularly and frequently given he would become restless and exhausted. Two days later the bowels, not having acted since the 22nd, were copiously relieved by three doses of prunes and senna, and he became very faint and languid after a soft copious motion.

30th.—Dr. West saw the patient again, and he did not think him manifestly worse. Among the bad signs must be mentioned the squinting, vacant expression, loss of flesh, and excessive constipation ; among the good ones, it must be remembered that the pupils are of equal dimensions, and contract uniformly under the influence of light, the temperature is low, the abdomen soft and the head cool, and there is no fever. He weighs twenty-one pounds. He was ordered a mixture of liquor strychniæ, dilute phosphoric acid, and water, three times a day.

July 8th.—He has gained nine ounces in weight in seven days, looking fuller in the face and being brighter. The squinting is much the same. He continues to take a good deal of stimulant, and eats turtle soup, jelly, &c. He was inclined to be sick after the medicine ; it was therefore given up. His head appears to be getting larger behind the ears, and his forehead more prominent, whilst the supra-orbital regions appear receding. This may be more apparent than real, as he has lost so much flesh, and the head is not unsymmetrical in shape. He has not the least power of raising or turning his head.

On the 20th of July he went to Norwood, and three days later he had gained six ounces in weight. He looks better and is lively, recognises those around him, and articulates distinctly. He squints somewhat less, and is apparently without pain of any kind. He sleeps naturally, probably from being so much in the air, and his bowels are less obstinate.

Sept. 14th.—Nearly two months have elapsed since the last report. He returned from Norwood, where his condition was variable for a week or two, but afterwards he improved with regard to appetite, absence of sickness and headache. He looks fresh and clear, and his face is fuller and animated, the eyes have quite lost their squint, but the extremities are wasted, especially the right arm, the fingers of which are flexed on the palm. The nurse says he moves the right arm better than he did, and the right leg also. He has now difficulty in getting out his words, and in speaking has a peculiar rolling motion of the tongue. At times he has a vacant and idiotic

expression, though he recognises everybody. The change most observed is the prominence of the forehead, the sunken temples, and the increased size of the head. He has lately taken cod liver oil, and had it rubbed in night and morning.

19th.—Dr. West saw him again with me in consultation in London, and agreed that it was best to desist giving medicines of any kind, as I had long decided. We advised his removal to St. Leonards, where he now is, and the reports that reach me are of an encouraging character. Three days ago I was told by the father, who had left him a few hours before, that the improvement was marvellous. He could move his head and all his limbs with greater ease. There was no sickness, and his bowels, an important point in the case, now acted regularly every day without any aid from medicine.

Remarks.—It must be allowed that this is an uncommon case, creeping on insidiously, reaching a certain point and threatening to be soon followed by more alarming symptoms, and even death.

Looking at the case from what point of view we may, there was little room at any time for encouragement to step in, and give us hope. At one stage of the illness or another there were most of the evidences of cerebral mischief: acute frontal headache; face expressive of suffering; contraction of the brow; moaning and frequent sighing; sweating and sudden vomiting without apparent cause; an indifference to all that was going on around him; strabismus of both eyes and dilated pupils, varying from day to day in their sensibility to light, but on the whole sluggishly dilated, the dilatation increasing with the patient's exhaustion.

The first occurrence of sickness was not enough to occasion any alarm; constipation, indigestion, teething, are all sufficient causes to produce it. Even graver symptoms of cerebral disease, such as defective vision, excessive constipation, imperfect locomotion, have all arisen from functional derangement, and left the patient healthy. Later on, the effort made to speak was difficult. A twisting or circular movement of the tongue and lips betrayed the intelligence, without the capability of articulation. The right arm and the right leg had in a well marked degree lost their power of movement, and the face was distorted by the unequal action of the muscles of the two sides.

At all ages in children, as well as in mature life, head symptoms are often puzzling and difficult to make out. To fix upon the precise point of the brain involved, and to form a correct diagnosis, is what the most gifted physician frequently fails to do. We must all have noticed from time to time what different opinions sound men in

theory and practice will give concerning a case of brain disease, as to the seat and degree of change, an examination after death often conclusively disproving the opinion of the whole. Similar symptoms in two cases do not necessarily reveal the same pathological change.

Affections of the nervous system long before they have reached such a stage as to affect sensation, motion, or speech, are shown by peculiar or ill defined manifestations, which those who have been much among children, and learned their ways and wants, will be sure to discover. When therefore a child complains of pain, and that pain is referred to the head, we should be culpable to overlook it. It is an important symptom—pain in the head of an adult is often neuralgic, pain in the head of a child is frequently organic. If attended with sickness, we must be cautious not to give it the simple interpretation, which the headache of the adult so often claims from indigestion or overtaxation of the mental powers, for in most cases, if it is continuous or recurrent, it has a local origin and there is danger.

With this melancholy array of symptoms, we come to the present condition of the child, and end where we began, by declaring that debility from poverty of the blood, exhaustion, bad food, &c., or some constitutional predisposition, interferes with the nutrition of the vital organs, and does no more for a time. By-and-bye one link in the fragile chain gives way, and then follows some lesion in one or more organs of the body! Let me add as favourable symptoms, that the motions and urine were never passed involuntarily; that the abdomen was never shrunken or contracted, and that the thermometer never ranged beyond the normal standard—in short there was no fever.*

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* Since this account was written (Oct. 1871) the child has wonderfully improved. He is fat and plump, and the muscles of his arms and legs are firm and well developed. He speaks more distinctly, protrudes his tongue in a straight line, and distinguishes persons and objects at the ordinary distance. He also seems to have made some improvement in the attempt to walk. When his feet touch the ground, he moves his legs awkwardly, but he has not the least power to stand, and the prospect of doing so seems very remote. His digestion is excellent, and his bowels act regularly. I consider the extreme care in nursing has been the cause of recovery so far. Debility followed the tedious laryngeal attack, but whatever the cause in operation may be, which determines the selected organ to be attacked, we cannot speak with certainty. The only hypothesis I would venture in this case, is that there existed some congenital weakness, which showed itself when the brain was becoming more developed.—*April 4th*, 1872.

CASE OF EMPYEMA: CURE BY FIVE OPERATIONS FOR PARACENTESIS AND USE OF DRAINING TUBE; WITH REMARKS.

By J. Shepherd Fletcher, M.D., Manchester.

Miss M., age 13, a fine well-developed but overgrown girl, who began to menstruate freely nearly twelve months ago, came under treatment, March 19th, 1871. Up to the date of her illness she has had remarkably good health, except that for some weeks previously she suffered from a severe cough, the result of cold, and had not taken her food in the morning so well as usual, often going to school without breakfast. Her family history is very good, no hereditary disease existing on either side, and no chest affection being known in the family.

March 19th.—Seized with shivering and most acute pain in the right side under the lower ribs; described as extending quite through her, even to the back. She endured very great distress in breathing, her respiration being exceedingly short and quick. Pulse rapid and hard; temperature 101; very frequent and almost constant dry cough; breath sounds normal; slight friction sound on right side. Calomel and opium, with mixture of chlorate of potash, &c., were prescribed, as well also as leeches and warm poultice to side. These remedies gave relief, and she slowly improved up to the 26th, when she had a very severe relapse, preceded by shivering, and followed by a return of the pain, which now became of such intensity that it appeared as if she must die; her sufferings amounting to agony so great, indeed, that it has seldom been my duty to witness anything like it; every movement, cough, or breath entailing upon her the most painful distress. The pain extended over the whole of the right side and round the waist from back to front, and was severely aggravated by each motion of the diaphragm, so much so that respiration became almost entirely thoracic. Pulse 140, small but hard; temperature 102; breath sounds normal, but friction sounds

extended over great part of right side. The application of leeches and hot fomentations, with opiates, gave some relief, but in the evening of the same day respiration again became so rapid, and the pain so violent from diaphragmatic spasm, that, failing to obtain relief by every other means, I ventured to try the inhalation of chloroform. This gave most marked relief for a time; and I cannot help but think that if she had not got this relief she must have sunk from intense suffering alone. During the next few days leeches were applied repeatedly, and always with more or less benefit to the patient. Calomel, opium, and salines, with small doses of antimony, were now chiefly administered to her. After this the pain subsided and the fever diminished, but the breathing was at times very distressing.

On the 30th, it was evident that considerable effusion had taken place into the right pleural cavity, and this continued to increase until, on the 17th of April, it became clear that the whole of this cavity was full of fluid; absolute dulness, with almost total loss of breath sounds, existing over every part of the right side, which had an increased measurement of nearly two inches. The heart was also pushed over fully one inch to the left side. During this time the pain had subsided, but the paroxysms of cough and apparent suffocation were most urgent, and accompanied always by vomiting, which nothing would relieve except the inhalation of small quantities of chloroform, and this was frequently used with great advantage. The subcutaneous injection of morphia sometimes brought about sleep. The vomiting of food became so serious about the tenth day that nothing would remain, until turtle soup was ordered, and this agreed with her better than any other food through the whole sickness; indeed, she never but once or twice rejected it. Without this nourishment she must have sunk from exhaustion, as she lived upon it alone for nearly a month, taking about forty-eight pints in about thirty days.

On April 17th, it was decided, in consultation with Dr. William Roberts, to remove the fluid from the chest, as no evidence of commencing absorption existed, and the symptoms of suffocation were at times very urgent. The trocar was introduced between the fifth and sixth ribs, but not more than about three ounces of thick pus could be removed, the tube becoming so blocked up with flakes contained in the pus, that the latter could not pass. This gave some relief for about twelve hours, although no change in the physical signs could be detected.

April 19th, in consultation with Dr. Roberts.—The symptoms continuing very grave, a larger trocar was now introduced, and one quart of very thick, but perfectly sweet, pus was withdrawn. The patient bore the operation well whilst it continued, but after it was over great distress arose from gasping and disturbed heart-action, during which it appeared as if she might die. The inhalation of a small quantity of chloroform and the subcutaneous injection of morphia gave relief in the course of an hour, and she continued better during the day. There was decided evidence by the improved physical signs of the reduction of the amount of fluid, but it was certain that a much larger quantity remained than had been removed, even though we had drawn off all that could be got to pass through the tube. After this the patient continued better for two days, but on the 22nd she became worse, the paroxysms of suffocation and cough being frightful. It was then decided in consultation with Dr. Roberts and Mr. E. Lund to operate again with a larger tube than the one previously used. The operation was effected by means of a simple large trocar covered with lint, soaked in carbolic acid and linseed oil, and the pus was allowed to drain away under the oiled lint. About one quart of thick perfectly pure pus was again removed, and considerable relief followed, with a diminution of the physical signs of fluid in the pleural cavity; but it was still evident that a large quantity yet remained, although no more could be got to pass through the tube. During the two following days she seemed better, and returning respiratory murmur became distinguishable over the upper part of the chest, front and back, and the heart returned somewhat nearer to its normal situation.

25th.—The symptoms being again very severe, the operation was repeated near the same spot with a still larger trocar, and about a quart of pus again drawn off in the same manner, (with ordinary trocar and oiled lint over). There could be no doubt that air was permitted to enter the cavity at this operation, no very special care being taken to prevent it. She was relieved, and all the symptoms were improved. During the night the patient's friends were caused much alarm by a great discharge from the wound, and on examination I found that at least three pints of pus had escaped, although we had removed by the operation all that could be got away. From this time she continued better until about the 2nd of May, when bad symptoms of cough and threatened suffocation again set in, and on the 5th as large a trocar as could be got between the

ribs was introduced near the original spot, and about three pints of pus taken away, without any care being taken to prevent the entrance of air, except a covering of lint saturated with carbolized oil. A large draining-tube of brass wire was then passed through the canula, and about three inches of it allowed to hang into the pleural cavity, and two inches outside. The canula was now withdrawn and the tube fastened with string and plaster, lint soaked with carbolized oil covering the whole. About two pints of pus passed through the night. The wounds were constantly, at regular intervals, dressed with the lint covering of carbolized oil fastened on with plaster. She continued to improve daily, and the lung to expand perceptibly. There was no great falling in of the ribs. Air frequently entered by the tube, often making such a loud gurgling noise that it could be heard in the next room, causing at first great alarm to herself and friends; but beyond this alarm it never induced the slightest trouble or the smallest inconvenience.

May 17th.—Free discharge continued for about a week, many quarts passing away. About the 12th it began to diminish, and for the last three days it has ceased. Lung has expanded, and there is every indication of the pleural cavity being now empty. The draining-tube was therefore removed without much pain or difficulty, and about a drachm of pus followed. The progress of the patient after this seemed satisfactory in all respects, and the opening soon closed. In the course of three weeks, however, she became worse, and there were indications of more fluid in the lower part of the pleural cavity. On the 10th of June, a swelling was discovered around the old wound in the side; this increasing rapidly, it burst in the night, and a large quantity of discharge, some pints in all, flowed away. This discharge continued during June and part of July, at the end of which time, being in all respects better, she was sent to the sea-side, where it gradually ceased. In the early part of September she was removed to Harrogate; here she took cold, and again the discharge began from her side, continuing for five or six weeks, when the wound permanently closed. Subsequently she progressed as satisfactorily as could be wished, and at the present time (March 1872) it is impossible to discover from physical signs which side has suffered.

Remarks.—With regard to the general treatment of this case there is not much to remark upon. The extreme pain, which in my experience always attends diaphragmatic pleurisy, in the early days threatened of itself to prove fatal; and nothing but the free

use of opiates (both subcutaneously and otherwise), together with chloroform inhalation, gave any relief. All the usual remedies were tried with the hope of promoting absorption of the effused fluid, but without the slightest good; and only when it was certain that medicine could not remove the fluid, and that if it were not quickly reduced in quantity the patient would die from suffocation, was paracentesis decided upon. One important point is worthy of notice with regard to diet. As is usual in extreme cases of this disease there was great irritability of stomach and frequent vomiting; all kinds of food were tried, but they were invariably rejected, and the patient seemed likely to die from exhaustion, unless such nourishment could be found as the stomach could retain. In this state I suggested real turtle soup, which proved invaluable; indeed, for more than a week it was the only food that would remain with the patient, both before and after the operation. In forty days she took fifty pints of it, and only once or twice rejected it; the only other support taken for about a month, being milk and soda-water with sugar and a few drops of brandy. Stimulants were never given in any quantity worth notice. This is not the only case by very many in which I have found real turtle of immense good, far beyond any other food I know. At each operation all the fluid that could be got to pass was removed, and if more could have been drawn off at once it would have been done; but owing doubtless to the want of expansion of the involved parts of the lung, this could not be accomplished. It seems to me that this case clearly goes to support many of those reported by Dr. Fuller of St. George's Hospital, proving the groundless nature of the fear as to the entrance of air into the pleural cavity. Such fear I have never believed in; and beyond the alarm caused to the patient and her friends by the noise made during the entrance and exit of the air when the draining-tube was in, not the most trifling injury resulted from its finding its way into the pleural cavity. One point we were a little anxious about after the tube had been in about ten days, which was, as to the possible corrosion and breaking up of the wire tube when it came to be removed. On its withdrawal, however, on the thirteenth day, it was found perfectly sound. After the first three operations the paroxysms of spasmodic breathing and breathlessness, with incessant cough and almost pulseless condition, were most alarming, so severe indeed that I was almost fearful each one would prove fatal. They seemed to me to be due in part to the difficulty the heart had in adapting itself at once to

the change of reduced pressure of fluid, from that which it had previously become accustomed to. Here it may be worth remembering that failing with every other means to give relief, I resorted to the inhalation of a very small quantity of chloroform, and found it far away the best remedy; and during the progress of the case this was very frequently used, to quiet the spasmodic paroxysms of cough and difficult breathing, and always with advantage. Another remedy which proved very useful in aiding the removal and getting off of the tenacious bronchial mucus, which at one time caused much distress from coughing, was the application of the sulphurous acid spray, and of a few drops of sulphurous acid on boiling water (the vapour being inhaled).

The result of this case is most satisfactory, and should encourage us to open freely, even earlier than was done here, into almost all effusions of fluid in quantity into the pleura, as the sooner the fluid is removed the greater must the chance be of the lung again regaining its normal state. I have seen in *an adult* almost as much fluid absorbed as was contained in this girl's chest; but I regret that I was not permitted to remove it earlier by operation, as the lung never again expanded; the chest remaining almost flat, although it is now three years since the fluid was absorbed.

ON DIPSOMANIA AND HABITUAL DRUNKENNESS.

THE EDITOR regrets that he is unable to present the Paper on which the following discussion was based. The statements of opinion which follow the discussion are the replies which have been received by the Editor, in answer to a letter addressed to those members of the Association who have devoted themselves to lunacy practice, and in which they were asked to aid in the settlement of a still disputed matter, by giving their views upon the following questions:—

Is Habitual Drunkenness ever a disease as contradistinguished from a vice?

If so, by what signs is the disease Dipsomania to be distinguished from the vice, Habitual Drunkenness?

What is the best treatment of each?

Dr. GRIFFITH (Camberwell) was glad to find that the suggestion thrown out at the last Session, for legislation on this important subject, was now about to be acted upon. He had always recognised two distinct forms of drunkenness; the first dependent upon hereditary or constitutional causes; the other upon vicious sensual indulgence; and that this latter might be subdivided into two classes,—one, in which the drunkard voluntarily and continuously indulged in his propensity; the other, where, being conscious of its evil and danger, and of the difficulty of self-restraint, he would willingly place himself under such control as would effectually debar him from further degradation. He pointed out the utter uselessness, in *all* these cases, of unassisted moral teaching and of the present mode of restraint; and urged upon the Association an active co-operation with Dr. Dalrymple, to procure such legislative measures as might offer, by prolonged compulsory treatment,

a reasonable chance of cure. He also referred to the great facilities which now existed for females of the better classes to procure stimulants if so disposed.

Dr. B. W. Richardson, F.R.S., (London,) said that he had been teaching, for years, that there was nothing in physic so weak and so erroneous as the mode in which medical men order alcohol. Many of them utterly ignored the fact, that there were in the different alcoholic drinks in ordinary use, both different per-centages of alcohol, and also different varieties of alcohol, each of these varieties having different actions on the body. Our first duty should be to give alcohol as we give drugs, with the same care in regulating the dose, and the same consideration concerning the fitness of the remedy for the disease and for the patient. As a general rule all neurotic diseases should be treated without alcohol, and also all hæmorrhages. He related a case of hæmorrhage from the anterior palatine artery, to the amount of five pints, which was successfully treated without alcohol, although the patient was reduced to an extreme state of faintness. In fever, again, alcoholic stimulants were injurious; on the other hand, the best remedy for intermittent pulse was alcohol.

In regard to the prevention of drunkenness he urged that medical men could, in many ways, do great service; and in none more importantly than by checking the administration of stimulants to the young; a common and a baneful practice. He agreed in the opinion that drunkards were of two classes, dipsomaniacs and habitual drunkards: in the one, drunkenness being a disease, in the other a vice. The former should be treated in somewhat the same manner as lunatics, the latter should be treated more severely and more determinedly like criminals. He thought Dr. Dalrymple was on the right path, although there were points in the Bill which he (Dr. Richardson) would wish to see altered. The Association could not be more usefully employed than in carefully watching the proposed legislation in the matter, and affording, as far as was in its power, every help to the enactment of such laws as might seem best fitted for the repression, direct and indirect, of the miserable amount of drunkenness which prevails. He moved,—

> "That the Council be requested to watch the progress of Dr. Dalrymple's Bill, and, at the proper time, to prepare an analysis of, and an opinion concerning the probable working of, the Bill; and that the Council

be empowered to communicate the same to a public meeting of the profession at large, and of the public, if the proceeding be considered advantageous."

Mr. Hepworth Dixon, in seconding the resolution, said that he looked upon legislation of this sort, when wisely and well considered, as likely to be of inestimable value to the people. The principle of compulsion in regard to education had been admitted in the recent Act; and that same principle, guarded against abuse, was equally applicable in regard to the important matter which was then the subject of discussion. It was well that a standard of right and duty in these matters should be set up in the law—what might be called mechanical or mathematical legislation—that men might have continually before them a plain warning against wrong doing.

Dr. Shorthouse (Carshalton) was of opinion that legislation, to provide for the purity of the articles supplied by the purveyors of intoxicating liquors, was much wanted.

Dr. Lush, M.P., (Salisbury,) agreed as to the existence of the two distinct forms of drunkenness, the vice and the disease. He objected to Dr. Dalrymple's proposal to give the magistrates power over the liberty of habitual drunkards; it was inconsistent with their position as licencers of the publicans. He thought that an extension and modification of the provisions of the Lunacy Act would meet these cases of drunkenness arising from disease—Dipsomania, as it was called.

Dr. Seaton (Sunbury) strongly supported the view that there is distinct and decided difference between dipsomania, the disease, and habitual drunkenness, the vice. The disease was not uncommon, but was often unrecognised; this disorder of the mind—for such it is—exists before the actual commission of the drunkenness. He related the case of a gentleman who would go to bed quite well, and would rise in the morning manifestly ill, out of spirits and out of temper, with almost a demoniac expression of countenance, and then, before the day was out, would begin drinking anything or everything in the shape of an intoxicating liquid. This was an extreme case; but he was a type of a large number having the same disease, with more or less well-marked antecedent symptoms. He (Dr. Seaton) advocated such a modification of the lunacy laws as would enable them to include dipsomaniacs. Habitual drunkards, the vicious as distinguished from the diseased, should be treated under different and stringently penal laws.

Dr. Crisp (London) thought that a more important matter, and one that more concerned the welfare of the community, could not come before the Association; he did not believe the distinction between dipsomania and ordinary drunkenness so clearly made out as many appeared to think. He (Dr. Crisp) had been nearly a teetotaller all his lifetime; he had never drank a glass of malt beverage, and, until the age of twenty-eight, had never drank wine or spirits, and now frequently did not taste them for months together; he therefore could speak practically upon this question, and he boldly asserted that, if alcohol were banished from the "face of the earth," its inhabitants would be both morally and physically benefited. But a heavy charge might justly, he thought, be brought against the medical profession for the encouragement that too many of its members had given to the use of alcoholic drinks, more especially to women after their confinements. When he (Dr. Crisp) entered the profession, and in the early part of his career, women were satisfied with gruel and a mild farinaceous diet for the first ten days; but now, wine, beefsteaks, mutton chops, and what was called "a generous diet," were the rage, and many a woman, he believed, had to thank her medical attendant for being a drunkard. According to the old plan women did well, and he had never seen any harm from the adoption of the abstemious method. But the evil did not stop here; charitable and bountiful women, with the best intentions, imitating the doctors, constantly sent wine and spirits to poor patients, who would be much better without them, and who, by this means, obtained a taste for stimulants that they never lost. He (Dr. Crisp) in the early part of his practice, remembered a remarkable example of this. A widower, who had had no children, married a widow who was also childless; the woman, after twelve months, was brought to bed with three children. The "Lady Bountiful" of the neighbourhood (under the mistaken notion that she required a large amount of nourishment and stimulation) supplied her with brandy, bottled stout, and port wine in abundance, so that she, who before was a steady industrious woman, became a confirmed drunkard. As regards the use of stimulants in the treatment of disease, the statistics so varied that it was difficult to draw useful inferences from them; patients recovered under all modes of treatment, and often in spite of the doctor. Take the treatment of fever, for example: some few bled their patients, some kept them from stimulants, and others gave a large amount of alcohol, and yet

each believed that the method he adopted was the best! There was one question of great importance, and one very difficult to decide, viz.: the propriety of giving stimulants, in certain diseases, to those who had been accustomed to take large quantities, especially after a certain age? He believed that the great bulk of the profession was in favour of continuing a certain amount of stimulus in such cases, and he (Dr. Crisp) had always adopted the plan of moderate stimulation in such examples; for, after a certain age, it was difficult to change even a bad habit with impunity. The late Mr. Tyrrel, at St. Thomas's Hospital, he believed, was one of the first to insist upon the necessity of attending to a patient's previous habits in the treatment of disease, especially in compound fractures and other accidents. Thus he found that brewers' men and others, who drank two or three gallons of ale daily, besides ardent spirits, quickly sunk unless supplied with their usual beverage; and after the stimulating treatment was adopted these cases ended more favourably. For, in such examples, much must be left to the judgment of the practitioner. Under any circumstances they told of the poisonous nature of alcohol in large quantities; for these men, who come from the country strong and healthy, have generally the natural span of their existence diminished by one half. In conclusion he should like to ask those who had made a distinction between dipsomania and ordinary drunkenness, what were the pathological differences that would warrant such a separation; as far as his experience had gone, there was no morbid condition that was characteristic of dipsomania.

Dr. Thomas Ballard (London) had hoped to have heard some definite information as to what should be done in regard to the very difficult matter before them. A great duty was incumbent on all medical men to discourage the unnecessary taking of stimulating liquors; and he thought that in the performance, privately, of this duty, even more good might be done in the prevention of drunkenness, than by legislation for the cure of it when developed and habitual. In his opinion, the class of people who suffer most from the abuse of stimulants were successful tradesmen with a very moderate amount of education and a considerable amount of money. The drinking of spirits was, in his opinion, much more detrimental than that of wine or beer. In regard to the treatment of hæmorrhage, he agreed with Dr. Richardson that alcohol was not needed.

The President, (Dr. Day, of Stafford,) in shortly summing up

the debate, said that, in regard to the administration of stimulants, he agreed that it was incumbent on the medical man to give definite, precise, and clear instructions. As to the distinction between dipsomania, the disease, and habitual drunkenness, the vice, he must admit that he could not recognise the existence of the former, and had heard yet of no means whereby, if such a disease ever existed, it could be recognised. The shutting up of people in prison for taking too much liquor was a difficult subject, and he confessed that he did not see his way clearly in the matter.

The resolution was carried unanimously.

This question is one of the first importance, and of very especial interest to us, not only as medical men, but as members of society at large. In discussing Dipsomania it is well to begin at the beginning. The inclination, then, or the impulse, or the passionate desire to partake of intoxicating drinks to excess is too palpable to admit of doubt; the fact is too painfully demonstrated to us each recurring day. Now this same impulse or passion is only one of many to which we are subject, and, like any one of such many—like, for example, an excess of hope, or of joy, or of anger—must have a location in our physical frame. Where shall we look for this location, to what portion of the organism refer it? Whence does habitual drunkenness spring? The old authorities on matters anatomical and physiological—following in the wake of the illustrious Bichât—fixed the emotions or passions "*in the viscera of the chest and belly*," or rather in the "*epigastric centre;*" but we have gone beyond this. Modern opinion is in no harmony with a doctrine so fantastic and illogical. The labours and teachings of the successors of Bichât have gone far to demonstrate that the brain and the passionate desires of man stand in the relation to each other of cause and effect. Even in the experience of every-day life, when the feelings, or emotions, or passions of the many of us run on an easy, smooth, and monotonous plane, and are seen rather in their use than in their abuse, we cannot, in view of the advances made in medical science, refuse to each and all of such emotions, &c.,—as, for example, pride, vanity, caution, benevolence, &c.,—a material or organic cause or basis; in other words, a portion of brain-structure whereon to rest, and to be dependent for either their individual or collective manifestations. If this position be accepted under all

ordinary states of the mental life, in how much more palpable and conclusive a manner is it pressed on our acceptance under the extraordinary and exceptional or depraved and excessive conditions of our being. If the several primitive and indecomposable mental faculties—by whatever names recognised, and whether relating to our intellectual, moral, or animal natures—are located in the brain, and are presided over by special and definite portions of cerebral structure, then does it follow that the appetite or passion for food and drink, being included in such primitive mental faculties, must, in common with the others, have its cerebral location or organ. Herein we get at the root or starting point of the whole question. It must be at this time evident to the physiologist that the nerves distributed to the palate and stomach take cognizance only of hunger and thirst, whilst the impulse or desire to eat as well as to drink is derived, altogether and entirely, from the brain, and from a comparatively small portion of it. The location of the organ of "*alimentiveness*" is undoubted; it is indicated by the prominence of the zygoma, and lies in a position anterior to the external meatus auditorius. This organ is represented by two cerebral convolutions, seen near the anterior and inferior part of the middle lobe of either hemisphere of the cerebrum; and, it should be added, in close connection with these, on either side, are found the external and greater roots of the olfactory nerves. Now, in certain cases, hunger and thirst are appeased or gratified, but there remains behind a passionate desire to eat and drink yet more, and to excess—an uncontrollable and morbid instinct to reach the debased condition of the glutton, or, to write more to the point, the dipsomaniac. Instances of such "certain cases" of "vitiated appetite" (Winslow) are without end; in one of which a *gentleman* (?) is said to have been in the habit of drinking at one sitting fourteen or fifteen glasses of brandy and water; and in another, "a young gentleman of fortune from the North of England," is reported to have drank every morning before breakfast "*a whole bottle of brandy.*" This same young gentleman was so old in the practice, so confirmed in his "morbid instinct" or "vitiated appetite," that he managed to dispose of two extra bottles by bed-time. His allowance seems to have been three bottles of brandy daily, independently of "*wine and whatever liquor came within his reach.*"

The persons here alluded to may be presumed to have suffered—as the majority of habitual drunkards do suffer—from an undue sensitiveness or irritability, if not from a positively diseased condi-

tion, of the organ of *alimentiveness*, so called. That they were insane—insane in conduct, but not necessarily in ideas—cannot well be doubted. So far, dipsomaniacs offer no exception to a general rule. It is admitted by psychologists that insanity is, in by far the majority of cases, a disease rather of the affections and desires in man, than of the intellectual qualities of the mind. The "moral insanity" of the late Dr. Prichard is no longer doubted; its existence is a matter of every-day experience. Moreover, a visit to the wards of any county lunatic asylum will assure the most sceptical on this point, viz., that lunacy is, on the whole, an affair of the heart, and not so much of the head, to write figuratively. A short conversation with either the maniac or the melancholiac will soon convince the enquirer that either one is the prey of exaggerated or perverted affections or desires. It will be seen that, whatever direction such morbid feelings or desires take, or however they may be indicated, the bulk of what appears of the ideal or intellectual is wholly subordinated, and lays prostrate and powerless in the hard grasp of deranged moral feelings or passions; of, it may be, an abnormal (excessive or perverted) condition of *self-esteem*, or *veneration*, or *destructiveness*, and so on. There is just this simple difference between either the maniac or melancholic, here referred to, and the dipsomaniac, viz., the last-named is, like them, the prey of a diseased or excessive feeling or appetite, but of one of another and dissimilar kind to theirs, and located elsewhere in the brain. The moral and not less the intellectual man is, in the three named, overborne, or put under foot, by the pressure of an exacting and tyrannical organic force; but the dipsomaniac is in this exceptional condition—he has yielded up his moral and better will to gluttony; *i.e.*, to an especial and sensual morbid indulgence of both the palate and appetite. Whilst entertaining these views as to the habitual drunkard or dipsomaniac, I am far from thinking that every man or woman who drinks occasionally to excess should be held to be the subject of disease. There can be no doubt that a large proportion of the drunken can have no claim to so valid an excuse. There are many whose associations in life are unfavourable to self-restraint in any form, and whose habits lead them more or less directly into excesses. Men and women, with their better natures untrained, and their passions over active, can hardly be brought together with impunity. In contact with each other, the social virtues degenerate into vices. The intercourse of such unfortunate people begets, for the most part, little else than a selfish animalism: and

in this case the too probable result is drunkenness. Herein is vice, not disease; herein we recognise the criminal, not the patient. Drunkenness is, so far and under such circumstances, a mere effect of a pre-existing state of things; one begotten in ignorance and bad general habits. There are, however, ways and means at our command whereby we can distinguish, with more or less accuracy, the vice from the disease; or, in other words, draw the line —it may not be quite a straight one—which separates the really vicious and criminal from the dipsomaniac.

The parentage or personal history of one addicted in any way to an indulgence in strong drinks demands the best attention. When it is known that the father or mother of A. or B. was habitually drunken, it is well that this much should be put to A. or B.'s credit; for no fact is better established than that of the hereditariness of intemperate habits. The excessive love of eating and drinking—or, in other words, the inordinate desire to partake of intoxicating substances in excess—is, in common with any other undue or exaggerated desire or passion, as likely as not to prove hereditary, or transmissible from the parent to the offspring. Old Burton writes, "If a drunken man gets a child, it will never likely have a good brain." Dr. Cardwell has confirmed the judgment of Burton in these forcible words, viz., "Every constitutional quality, whether good or bad, may descend by inheritance from parent to child. And a long continued habit of drunkenness becomes as essentially constitutional as a predisposition to gout or pulmonary consumption. This increases, in a manifold degree, the responsibility of parents in relation to temperance. By habits of intemperance they not only degrade and ruin themselves, but transmit the elements of like degradation and ruin to their posterity. This is no visionary conjecture, the fruit of a favourite and long-cherished theory. It is a settled belief resulting from observation, an inference derived from innumerable facts. In hundreds and thousands of instances, parents, having had children born to them while their habits were temperate, have become afterward intemperate, and had other children subsequently born. In such cases it is a matter of notoriety that the younger children have become addicted to the practice of intoxication much more frequently than the elder, in the proportion of five to one."

Nor were the ancients less assured of the transmission of drunken habits, *i.e.*, dipsomania, by hereditary descent. Hear with what eloquence Plutarch wrote, some two thousand years ago, concerning wine-bibbers and drunkards:—

"The advice which I am now about to give," says Plutarch, "is indeed no other than what hath been given by those who have undertaken this argument before me. You will ask me, what is that? 'Tis this, that no man keep company with his wife, for issue sake, but when he is sober, as not having before either drunk any wine, or at least not to such a quantity as to distemper him; for they usually prove wine-bibbers and drunkards whose parents begot them when they were drunk. Wherefore Diogenes said to a stripling somewhat cracked-brained and half-witted, Surely, young man, thy father begot thee when he was drunk."

But apart from the diagnostic evidence to be had of an hereditary character, we may very properly consider the frequency and extent of the indulgences, so called. The more frequent and the longer continued these may be, the greater is the probability that such "indulgences" are to be attributed, not to the mere vice, but to a positive brain disorder. The conditions of the drunken bout, the collateral circumstances thereof, and so on, are elements which carry more or less practical weight; and cannot, therefore, be otherwise than duly considered in our attempts to distinguish the criminal from one afflicted with a positive disease of the great nervous centre or centres. Further even than this, it will be found, not unfrequently, that the distinction between the *vice* and *dipsomania* will be made the more easy and apparent if we give our attention to the ordinary externals, so to speak, of the party most concerned. Even the attire, the general deportment, and style of address, are so many aids to the formation of a just opinion. If these are seen to be peculiar and exceptional—if the speech and manners are not quite in harmony with things as they are—if what he says or does has but little or no normal relation to, or connection with, the then present circumstances as they crop up and succeed each other—if he lives, in a measure, apart from his surroundings and responsibilities, and independently of them, realising an eccentricity more or less broad and palpable—if, in a word, he has the "insane diathesis," so called,—then is it to be inferred, even in the absence of everything like evidence of the presence of an hereditary taint, whatever excesses mark the case, that such are the consequences of disease; that he (A. or B.) is the subject of a localised brain affection; and that this it is which constitutes a proximate cause of his passion for strong drinks.

It cannot be too well known that this same "broad and palpable eccentricity" mentioned is, in itself, a plain indication of the exist-

ence of an incipient brain mischief, a sure criterion of some kind of defection in the great nervous centres; a "defection," involving a certain cell deterioration, a falling away as it were of the normal "*nisus formativus.*" (Müller.) A state of things this analogous to that which lies at the root of the neuroses generally; of, it may be, neuralgia, epilepsy, and chorea, as well as of the many other and allied abnormalities recognised in medical practice. These named—including the several forms of insanity, and *dipsomania*—are, it is well known, but parts of one whole, phases of one pathological being, links in but a single chain of diseased action. To come yet closer to the main point, madness and drunkenness are ever closely connected; they constitute mere modifications or varieties of the many nervous derangements or disorders common to mankind. Either one may precede or beget the other of them; either may stand in relation to the other, as the cause or the effect, so nearly and indissolubly related are they. Not unfrequently the first or very early sign or symptom of ordinary mania consists in drinking to excess; the rapid and incoherent speech, the delusions, &c., succeeding, tell plainly enough their own tale. But this tale, I fear, is not always read as it should be; and so it is that our medical friends—failing not unfrequently to get at the order of occurrence of the several indications of *cerebro-mental disease*—mistake it for the occurrence of mere vice or casual drunkenness; hence the sad consequences to the patient of inattention and neglect of the necessary medical care. In these cases the mental excitement, the oft-succeeding fancies, the incoherence, the depraved or exalted emotions, and the general extravagance of conduct—and equally with these well-marked symptoms of mania, the all-absorbing passion for strong drink—keep company with each other, take much the same course, and travel over the identical ground toward either recovery or ultimate extinction.

The preceding remarks, designed to show the close analogy of the several morbid states named, and their very general dependence on one common or "*centric*" (M. Hall) origin, may not unlikely be thought overdrawn. In proof that they are not so, but express only a plain fact in medical science, let me quote the following from Dr. Maudsley, viz., "Mental disorders are neither more nor less than nervous diseases, in which mental symptoms predominate, and their entire separation from other nervous diseases has been a sad hindrance to progress." (Lecture II. p. 41, *Body and Mind.*)

Again, "There is a form of *neuralgia*, which is the analogue of a *convulsion*; and there is a *mania* which is the counterpart, in the highest nerve-centres, of *neuralgia* and convulsions in their respective centres." (Lecture III. p. 81, *ibid*). Dr. Anstie writes thus in the January number of *The Journal of Mental Science*, viz., "It has now been sufficiently demonstrated in a general way that there is handed down, in certain families, a tendency of the individual members to inherit from their parents, either a particular nervous disease—for instance, insanity—from which they suffered, or else, and this quite as frequently, some other disease of the nervous system. Thus it often happens, in these neurotic families, that an insane progenitor will endow a variable number of his descendants respectively with epilepsy, with neuralgia, with insanity, with invincible tendencies to drink, with brain softening, or with chorea; the more fortunate of his descendants escaping with only some more or less strongly-marked irritability of nervous system, which may express itself chiefly in mental sensitiveness and impulsiveness, or in the existence of some slight local spasmodic affection, or in a general eccentricity of character which it is impossible to define. Or it may be that the vicious circle of nervous degeneration began at an earlier stage; for instance, the insane progenitor was himself the child of a drunkard, whose habitual intemperance had been the starting point—as there is reason to believe it often is the starting point—of a lowered nervous organisation of the family stock, which will show itself in the various ways already mentioned."

The celebrated Morel has given the annexed antecedents or personal history of an idiotic lad admitted into the asylum at Rouen. It illustrates, in a very complete manner, the pathological principle (so to put it) which it is my endeavour to fasten on the mind of the reader.

"First Generation.—Immorality, depravity, alcoholic excess, and moral degradation, in the great grandfather, who was killed in a tavern brawl.

"Second Generation —Hereditary drunkenness, maniacal attacks, ending in general paralysis, in the grandfather.

"Third Generation.—Sobriety, but hypochondriacal tendencies, delusions of persecutions, and homicidal tendencies, in the father.

"Fourth Generation.—Defective intelligence, first attack of mania at sixteen, stupidity, and transition to complete idiocy."

The means of prevention and of cure of dipsomania remain to be considered. It must be a source of congratulation that very many good

and earnest men are looking keenly toward the means whereby the vice of drunkenness may be arrested, or at any rate diminished; and inasmuch as this vice proves so commonly the stepping-stone, or first cause, of that morbid condition of the brain (mind) which begets dipsomania, it is of the first importance to attack it—to keep it within due bounds. In the absence of the necessary and personal restraint — that enjoyed by the moral man, educated and trained in the exercise of the higher qualities of his being, and ever under the guidance of a pure taste and judgment—it would be, as as I conceive, expedient to visit the crime of drunkenness with a more positive and direct punishment than is now the practice, or the present law allows. The mere imposition of a money fine may not be considered sufficient. Such a mode of dealing with a habit so gross, and so serious in its consequences to both the individual and society, can hardly be deemed right or proportionate in any way. The proper course for modern legislation to take in this matter would be, probably, (1) to diminish the present very numerous temptations to drink which stare us in the face, to whatever quarter we may look, in the shape of beer-shops, public-houses, and gin-palaces; such are, it is too plainly seen, far beyond and out of all proportion to the real wants of the public, and constitute therefore so many snares and nuisances, to use the mildest terms, and to write in the most liberal spirit; (2) to render the modes of correction or punishment of the sot or drunkard both more certain and more severe than they now are.

In reference to the first suggestion made, a writer in *The Times*, in a letter dated January 3rd, 1872, signed, "An Englishman," recorded the fact that the South-East Devon Chamber of Agriculture have passed the following admirable resolution, viz.:—

"This Chamber, while acknowledging the necessity of ameliorating the condition of the labouring classes by education, by improved dwellings, and, when necessary, by an increase of wages consider that no steps in that direction will produce any lasting benefit so long as such powerful temptations to improvidence and intemperance are offered by the undue number of small public-houses and beer-shops which at present exist throughout the country, and which divert from their proper application so much of the earnings of the wage-receiving class of the population; and this Chamber desire to call the attention of the other Chambers of Agriculture to this great evil, and to solicit their co-operation in devising some course of action to recommend to the Imperial Legislature for its abatement."

So good an example, it is to be hoped "other Chambers of Agriculture" will hasten to follow.

So far as the second suggestion goes, let me call the reader's attention to the following words from the pen of the late Dr. Symonds, of Clifton:—"When we contemplate these cases, have we not, as a *soi-disant* well-ordered community, reason to blush with self-reproach that, up to this period of the nineteenth century, with all its intellectual and moral culture, and its singularly advanced philanthropy, our laws have done nothing effectual to guard society, families, helpless women and children, and the wretched offenders themselves, against habits so odious and despicable, by any adequate restraint or deterrent penalties? Some of us might feel ashamed that no check should have been imposed by our laws on the facilities for alcoholic intemperance; or that there should have been so insufficient a legal recognition of the criminality of intoxication, as that which is implied in the adjudication of trifling fines." Again: "Even if the government or legislature do not think it just to interfere with the supply of temptation by restrictions on the sale of alcoholic drinks, one does not see why they should not impose stronger penalties on persons found in a state of intoxication. It would be no little good if, through a sterner action of the government, drunkenness could be denoted and defined, and denounced as a crime. It is already an offence against good society, but were it treated as a breach of the law, distinctness and precision would be given to what is now indefinite. Instead of being regarded as a state only a little removed from hilarity, conviviality, and good-fellowship, it would become a crime and a shame, dragging the practisers of it within the scope of penal jurisdiction."

But preventive means, however laudable and successful, will ever have their limits. Develope them as we may, the sure and abnormal effects of strong drinks on the brain and nervous system of mankind will be found more or less rife among us; and it behoves us then to be in a position fully and fairly to recognise these effects, with the view to their general and medical treatment. Now dipsomania may be said, for practical purposes, to come before the medical practitioner in two forms, viz., *acute* and *chronic*. The former, known as *delirium tremens*, is indicated by an extreme irritability of both mind and body. The cerebral faculties and the bodily powers represent a state of complete unrest. The patient can settle himself to nothing; he walks about and to and fro incessantly, but ever in the most purposeless manner.

His thoughts, and not less his desires and movements, are in great part involuntary. Whatever he does or says is prompted only by a morbid sensitiveness; *i.e.*, a subjective and physical condition of his nervous centres, the effects of which, on his speech and conduct, are proof against all continuous or due self-restraint. So it is he is brought down to the low level of a mere automaton. Exhausted in the absence of sleep, full of apprehension and mistrust, with enfeebled motive powers, countenance wan and pale, pupils dilated, by turns morose and loquacious, pulse rapid and feeble, skin hot and dry and harsh, a loaded or red tongue, and fœtid breath, the habitual drunkard but reflects the mode and the extent in and to which an all-sufficing nature can and will punish mankind for a sinful infringement of the organic laws. In the latter, or chronic affection, we see the several signs or symptoms detailed here of a milder form, of a less urgent and continuous character. The unrest is less apparent, and the manner less purposeless. Some amount of normal volition characterises the conduct of the sufferer. He is not so automatic in his movements. The nervous centres are less gravely affected or perverted in their action, and the other external signs of disorder are not so palpable. The patient is nevertheless in a sad and pitiable condition: he cannot be regarded as one competent to his own control in any way. This chronic affection will hold its power over its possessor, will so affect his conduct as to drive him, in the absence of proper care, into the old excesses or indulgences. This form of the malady (dipsomania) may or may not take on a periodic phase, or may occur from time to time,—many days or even weeks intervening. In the absence of the paroxysm, the habits, general conduct, and behaviour of the patient are, not unfrequently, all that can be desired. But whatever the form dipsomania may assume—whether the acute, the chronic, or the periodic—it demands our best attention. As there are gradations of drunkenness, or dipsomania, as of all other abnormal conditions, so must the curative means, of whatever kind, be graduated or adapted to the peculiarities and requirements of each case. Where the affection is acute—as in *delirium tremens* so called—there cannot be any kind of doubt, in the minds of reasonable men, as to the propriety of regarding and treating it as one of ordinary *mania*. "*Mania a potu*" is essentially madness. Insanity of a temporary nature it may generally prove to be, but it constitutes, without any exception, a most serious and dangerous form of illness; and to it we owe the existence of a multitude of crimes, and no end of suicidal

deaths. That the Commissioners in Lunacy take much the same view of delirium tremens (*mania a potu*) appears from the fact that, in dealing with patients so afflicted, they (the Commissioners) "have shown a humane desire to protect them, as far as possible, from destruction, by sanctioning, with a view to their personal safety and restoration to health, a detention in asylums for some length of time after the immediate effect of the drinking debauch had subsided." (Winslow). Even in the chronic cases, *i.e.*, in the milder or periodic forms of dipsomania, and wherein the mere habit or vice is more than confirmed—has, in fact, passed into disease, and taken on, it may be in part only, those general and physical characters already detailed—I cannot hesitate to recommend the adoption of much the same course; for of what real utility can liberty be to one in such a state of being, which must one day prove fatal to both his morals and his life. The relatives of all such moral invalids should decide, whilst there is yet some prospect of relief or cure, on their removal from home, and on their seclusion under circumstances which, though favourable to the general health, and to the well-being of the inebriates, are yet inimical, in every possible way, to either the gratification of their besetting sin, or rather, and to put it more correctly, inimical to the use of means calculated only to aggravate the disorder which is already preying on them even to death. The legal sanction of the State cannot, under the pressure of existing facts, and the large amount of drunkenness—whether regarded as a vice or a disease—long be withheld. Now, the certain and more direct and positive punishment of the casual drunkard would, it is fair to conclude, diminish the bare vice—the remote cause in the individual of the disease (dipsomania)—and, as a sequence, limit the acute and the other milder forms of delirium tremens, now everywhere so common. When, too, the "habitual drunkard" is looked on as a madman, and treated as such, by both the State and the public, then may we be sure that the number of such will not be what it now is, but very materially diminished. Backed by the approval of such men as Mr. Fawcett, M.P. for Brighton, and Dr. Dalrymple, M.P. for Bath, we may hope, ere long, to see the *Sanatorium* acknowledged as the proper and legitimate—though, in most cases, the temporary—home of the dipsomaniac. This sanatorium, or temporary retreat, may and should command not only all the comforts, privileges, and means of cure held to be necessary for him, but also all needful restraints or checks to his depraved and morbid appetite—*i.e.*, his perverted and disor-

dered tendencies and passions. The dipsomaniac is little, if anything, else than a child of a large growth, and therefore should not be treated else than as a child. Neither the *bonâ fide* child nor the dipsomaniac can take the necessary care of itself or himself; both are wanting in due controlling power over their several acts: and hence it follows that, if the State and society require or demand that the guardians or parents of children must and shall send them to school or elsewhere to be cared for and educated, the same State or society should require or demand the relatives of those habitually drunken, or suffering from madness of an especial kind, to find for their helpless brothers or sisters, or what not, some appropriate place of seclusion, where he or she may be trained to other and better habits; and encouraged in the exercise of those higher feelings so indispensable to the due restraint of inordinate desire, or exaggerated impulse of whatever kind.

Children are not asked if they will go to school; they are sent. The ordinary dipsomaniac may, as a general rule perhaps, be encouraged to put himself voluntarily away from temptation, and under the necessary treatment, in a sanatorium; but when he will not do so, he should be done with as if he were suffering from the acute form of the malady, from delirium tremens; that is to say, he should be secluded in spite of himself, or by compulsion. For this much a wise and considerate legislature will, ere long, make due provision. Our American cousins have in this matter given us a wise and humane example; for at the "*Washington Home*," at Boston, opened in 1857 as an Inebriate Asylum, the results which have followed its operations have been most successful and satisfactory. Thus, of 3,000 dipsomaniacs admitted, 2,000 have returned to their homes, to all appearance, permanently cured. Similar results are reported to have been realised at the "New York State Inebriate Asylum" at Binghampton. "In twenty months 310 persons were received, and fifty per cent. discharged, having, to all appearance, reformed, after a single probationary trial." (*British Medical Journal*, April 15th, 1871.)

The medical treatment of the various stages of drunkenness, or dipsomania, including the first link in the morbid chain—that is, the mere vice, and ending with the acute stage of the disorder, or delirium tremens—may be very properly treated here in a general, rather than in a detailed or particular, manner. In the first place, then, it may not be desirable to put else than a limited confidence in specific remedies, so called, for the inebriate. Tartarised antimony

and the preparations of iron have been said to get rid of the desire for intoxicating drinks. The first-named has been much extolled by Dr. Kain (an American physician), as well as by the late Dr. Macnish. It is no doubt preferable to treat dipsomania on general principles, to let each case rest on its own merits. No two habitual drunkards present identical features, or are seen in quite the same stage of the disorder. From the first stage to the last—from the incipient vice, or early and growing habit, to the acute paroxysm of delirium tremens—throughout the several links of the morbid chain, so to put it, the indications of medical treatment will vary somewhat. Farther, no two patients, though in the same stage or phase of the disorder, will—else than as an exception to a general rule—require quite the same medicaments. What will relieve one, will not always relieve the other. The indications of treatment may be said to be—

(1) To remove the exciting cause.

(2) To restore the healthy action of all those organs concerned in digestion, *i.e.*, to substitute normal for depraved secretions.

(3) To maintain the *vis vitæ*, *i.e.*, support the patient's strength.

(4) To subdue morbid sensibility of the nerve centres, and so to procure sleep.

These several indications should be kept in view from the commencement to the termination of *delirium tremens* or *dipsomania ;* and and the treatment, of whatever kind, should be so modified or adapted as to reach, day by day, the most urgent or predominant symptoms.

So far as my experience has gone, the *primæ viæ* are invariably out of order. This state of things may exist either as a cause or a consequence of the abuse of intoxicating fluids. In either case, aperient medicines are called for. Such should be continued ; and with the effect even of keeping up an action, more or less free, on the bowels. The spirits of chloroform, or, what is much the same thing, chlorodyne, in camphor mixture, may be given for the relief of unpleasant (sinking) sensations, often complained of and referred to the epigastrium. To combat the restlessness and sleeplessness, Ferris and Co.'s syrup of chloral-hydrate, or Squire's solution of the bimeconate of morphia may be given. The general state of ill health (alcoholic cachexia), as shown in the dusky or muddy complexion of the patient, the quick and weak pulse, &c., calls for the aid of tonics. The tr. calumbæ, with the nitro-muriat. acid in camphor mixture, constitutes a useful medicine ; and so also does the cit. quinæ et ferri., or the cit. ammoniæ

et ferri. Exercise in the open air, regular habits, a careful dietary, with varied and agreeable occupations or amusements—in a word, a close attention to hygienic rules and practices—must, of necessity, go hand in hand with the medical treatment. Moral means, too, of a kind in harmony with the patient's idiosyncrasies and requirements, should by no means be neglected: these, modified day by day, or even hour by hour, to meet the passing and temporary exigencies of the case, should on no account be neglected. Kind and encouraging words can do much good, and may be well employed to assist the enfeebled will, and ensure the due restraining influences. Reproof also, when well and even kindly and judiciously resorted to, may be pressed at certain times into the good service of the patient. But whatever is done or said must be done or said with a will, and persistently, and not by fits and starts. The great end in view—the relief and cure of the sufferer—must be ever present to us; and to it the varied means and appliances at hand must be, without any intermission, and day by day, made the most of. So well known is it, that—

> "That monster, Custom, who all sense doth eat
> Of habit's devil, is angel yet in this;
> That to the use of actions fair and good
> He likewise gives a frock, or livery,
> That aptly is put on. Refrain to-night;
> And that shall lend a kind of easiness
> To the next abstinence: the next more easy;
> For use almost can change the stamp of nature,
> And either curb the devil, or throw him out
> With wondrous potency."

J. G. Davey, M.D.,
Northwoods, Bristol.

In my opinion Dipsomania is a reality, and I am also inclined to believe that it is hereditary. Habitual drunkenness I look upon as a vice; it commences by degrees, and gradually grows upon the person until it becomes a necessity; and the effects depend upon the constitution, and the amount, and the nature of the drink taken; when the habit has been of long duration, symptoms of brain disease manifest themselves, and the person ultimately becomes demented.

In dipsomania there are paroxysms of morbid thirst, and crav-

ing for drink, which last a few days; followed by an interval, when the persons will resume their usual occupations, abstaining for a time from all intoxicating liquors, again to be succeeded by another paroxysm; and these paroxysms and intervals go on until such times that the person is attacked with confirmed mania.

With regard to the treatment, my belief is that compulsory seclusion is about the best remedy, and that it might be effected by having a law whereby the person could be sent to some reformatory or asylum.

R. A. Davis, M.D.,
Stafford County Asylum, Burntwood.

I have not time to enter deeply into the question of Dipsomania, and will only make one or two remarks.

In my opinion habitual drunkenness is generally, nay always, a disease. That is to say, habitual drunkenness does not occur in persons absolutely free from mental disorder, or disease of the brain. Perhaps it is more correct to say that the craving for stimulants, and the inability to exercise moral self-control and resist that craving, are but symptoms of a disordered or a diseased brain.

No especial drug is of any use in this disease. When brain disturbance, from which arise these symptoms, is the result of disordered general health, alteratives, with tonics and cod-liver oil, are of great benefit, and the patient may be cured, but in cases where the bodily health appears to be good, digestive and other functions apparently normal, I know of no drug that will affect the depraved appetite.

Seclusion, again, is only a *preventive*, not a *cure*. You may keep such a dipsomaniac for years in enforced restraint from stimulants, and he will appear to be like other men. When this restraint is relaxed or removed, the slightest temptation is sufficient to upset his self-control, and the craving instantly returns. I do not remember a single case of cure in dipsomania, where the bodily health was good. In these cases the symptom is due to actual disease, and not transient and removable brain disturbance.

H. L. Harper, M.D.,
50, *Gloucester Place, Portman Square, London.*

Habitual drunkenness is a vice, not a disease. Treatment is of no avail unless the inebriate be debarred the use of all intoxicating fluids. Habitual drunkards ought to be more severely punished than by a five shilling fine. The magistrates should have power to deprive them of liberty for a stated period, but not to send them to a prison or lunatic asylum. Homes for habitual drunkards should be made self-supporting. Without legislation nothing can be done to blot out or mitigate this great moral evil.

ROBERT GARDINER HILL, L.R.C.P.,
Earl's Court House, London.

I have only time now hurriedly to say, that I believe there is a disease or morbid condition which may be called Dipsomania, insane drinking, or any other term you please, which renders an individual dangerous to himself and others, unsafe to society, incapable of self-control and of managing his affairs, and a fit subject for restraint of some kind, so as to check the irresistible craving for alcoholic drinks and cure the morbid condition or disease. I am strongly of opinion that some legislative measure is necessary to place dipsomaniacs under control and treatment in asylums, or, what would be better, in special institutions, as in America. I hope Dr. Dalrymple will solve this important question during the coming session.

J. MURRAY LINDSAY, M.D.,
Derby County Asylum.

It is my opinion,—

(1) That habitual drunkenness is at times a disease.

(2) It may be distinguished from the vice by the *irresistible* and prolonged craving for alcohol, and also by the utter recklessness of the dipsomaniac, who sacrifices everything in the world for the gratification of his thirst.

It is best treated by total abstinence.

(*a*) By Parish's syrup of the phosphates, with cod-liver oil, iron, quinine, &c.

(*b*) Hard work, and occupying the mind as well as the body, watching the party, and keeping him out of the way of temptation.

(*c*) Voluntary seclusion for a long period.

(*d*) As yet, compulsory seclusion cannot be enforced in this country.

I entirely concur in the steps now being taken for legislative protection to the drunkard, with a view to his reformation and recovery. Compulsory seclusion in America has produced most gratifying results, and doubtless saved many persons not only from continuing to lead dissolute lives, and ruining themselves and families, but in many instances from insanity and death.

If Dr. Dalrymple's Bill should become law, that power will be given to restrain all habitual drunkards, under medical advice, and for long periods, so as to effect the end in view.

Habitual drunkards in the United Kingdom are seldom cured, in consequence of there being no asylum in which they could be treated for their benefit.

Dr. Dalrymple deserves the thanks of the public for his meritorious exertions in favour of a large class of the community.

ALEXANDER MACKINTOSH, M.D.,
Glasgow Royal Asylum.

In reply to your first question, "Whether drunkenness is at times a disease, to be distinguished from vice," I do not go so far as to say that it never is, as I am aware that the opposite view is held by many who have had good opportunities of observing individual cases of drunkenness; but I do say, that I have never yet met with a case in which I could regard the mere propensity to drink in the light of a disease.

This statement, however, requires some little qualification. I do not mean, of course, that every one who drinks to excess is to be held responsible for what he does, for the habit of drinking frequently occurs as an early symptom of insanity in persons, who, before mental disease manifested itself, led temperate and regular lives.

In such cases it can no more be considered as a vice, than appropriating other men's goods, using foul obscene language, shameless lying, or the numerous other moral perversions which are frequently some of the earlier symptoms of mental disease.

There is unfortunately, a looseness of expression common amongst medical men in speaking of this subject; the term Dipsomania implying, with some, an irresistible impulse to drink to

excess, which can only be regarded as a disease, whilst with others the same term is used to express the form of mania brought on by excessive indulgence in alcoholic liquors, without pre-supposing a diseased condition to start from.

The first-named variety, I repeat, I have never met with, the last is extremely common in this part of the country.

But because I have never met with such a case, I do not deny that the condition may exist, and be as distinct a form of mental disease as homicidal or suicidal mania, both of which I have observed myself; but as there is always considerable suspicion attaching to *ex post facto* explanations of what would in sane individuals be treated as crimes, so there appears to me to be a still greater suspicion attaching to the palliation of drunkenness on this ground, seeing that the chief evidence is often the mere assertion of the individual, the subject of the temptation, whether irresistible or not.

But without recognising drunkenness, pure and simple, as a disease, there are many conditions in which the power of withstanding temptation is so slight—from the moral weakness produced by long continued indulgence, or from hereditary predisposition, (the sins of the fathers being visited upon the children,) or from faulty nervous organization depending on other causes—that the persons in whom such conditions are found require to be treated in the same manner as if they were the subjects of actual disease, and this brings me to your second question.

(*a*) I know of no drug which can be considered to act in any way as a specific against drunkenness, though I know of many, the abuse of which has ultimately led to a taste for more vulgar forms of spirits. I exclude from consideration here, all drugs given for the purpose of relieving a recognised disease of the brain, and so incidentally curing the propensity to drink to excess which arises from it.

(*b*) For those who, if they drink at all, are unable to resist the temptation of drinking to excess, I believe the only safety lies in total abstinence. I have met with instances, where men have had the conviction that "the curse of drink" was a portion of their inheritance, and have felt that nothing less than complete abstention could insure them from the evil tendency of their constitution, "the tyranny of their organization," and by following this course they have saved themselves.

(*c*) I think that voluntary seclusion should be tried where available, failing the attempt at "total abstinence," but I should

anticipate very little good from this, as few habitual drunkards would submit to it.

(*d* & *e*) Failing these preventives, I think compulsory seclusion should be made legal. I would give magistrates power to commit habitual drunkards to a place of detention, in the same manner as lunatics are dealt with, upon certain conditions :—

1st. That all available means had been previously tried to reclaim them without success.

2nd. That the habits of the individual were tending to the ruin of himself or his family.

3rd. That the parties who moved for protection were actuated by perfect *bona fides*.

I would make the seclusion for a given time at first—say three months—increasing the period on each subsequent occasion up till the third time, after which the seclusion should be life-long.

The method I adopt in the Asylum now, in the case of patients who cannot resist the temptation to drink when at large, is to debar them entirely from beer whilst in the Asylum, unless their health requires it, and in some bad cases to interdict tobacco also, (which is a greater punishment). I have in some instances found that this has had the desired effect, and that when the patients have returned to their friends, they have not yielded to temptation again. These suggestions are mere outlines, but will I hope serve the purpose for which you want them.

T. L. Rogers, M.D.,
Lancaster County Asylum, Rainhill.

I have a very unorthodox suspicion of all the monomanias, believing they have been too frequently regarded by authors as distinct maladies, rather than as particular expressions of a generic disease. These particular expressions are associated with, and dependent upon, centric irritation, which, though perhaps temporarily localised, may at any moment involve the entire material apparatus of thought and feeling. But what is termed Dipsomania, or Oinomania, has, perhaps, a more recognised existence, and a better defined history, than any other of those singular neuroses which from their most prominent symptoms have derived distinctive appellations.

The experience of alienist physicians certainly points to the con-

clusion that the taste for alcoholic drinks is frequently inherited. It is transmitted by the insane to their offspring in the same way as epilepsy, or gout, or insanity itself. In fact it is a distinct hereditary neurosis, which may suddenly develope itself, though probably not idiopathically, in persons who, in their own individualities, have given no previous evidence of its existence. But even then, as Morel has remarked, it may be regarded as the chief and prominent symptom of a particular disease. The interlacings of the insane temperament and the alcoholic temperament are very intricate and instructive, and tend to show, in many cases, almost unmistakable identity. Moreau says, "Drunkenness is regarded as one of the most frequent causes of insanity. And assuredly the fact is not to be doubted. But it is equally certain that drunkenness, or rather the *taste for drink*, is as often, and even more frequently, the first symptom (the effect, therefore, and not the cause) of disease." And this taste, he affirms, has been hereditarily transmitted from the parents to their offspring, just as the same features, and gait, and colour of hair and complexion. "I receive insane patients daily at the Bicêtre, in whom I can trace back the origin of their malady to nothing else but the habitual intoxication of their parents." The converse is equally true; and the insanity of parents is perpetuated in the shape of alcoholic thirst and general depravity in the descendants. Moreau further adds, "A large proportion of those who become insane by reason of alcoholic excess have had insane or highly nervous parents. A number of them would never have become drunkards if a particular nervous state, consisting of an imperious and irresistible want — some '*surexcitation nerveuse*' — had not dragged them into the indulgences in which they find relief."

Physiologically it is interesting to determine what the sensation of this desire for strong drink really is—whether it is analogous to the intense thirst sometimes felt by ourselves after profuse perspiration.

Certainly I have seen patients who have keenly and remorsefully felt the calamities which they have brought upon their families and themselves, and have most faithfully resolved, on quitting the Asylum, to resist every temptation to any form of alcohol. Several instances I can recall where I had the greatest confidence in the promises of those who made them, and the more so as they had wives who were in every way devoted to and prepared to aid them. But they fell easy victims to what Esquirol calls "a morbid and irresistible impulse," and so were thrust back again into all their troubles.

Each time nerve-element is more degenerated, and functional disturbance more marked. The inevitable sequence is imbecility and dementia. The memory fails; the expression becomes blank and fatuous; paroxysms of excitement are not unfrequent, which may or may not be associated with homicidal or suicidal impulses.

The sterner and stiff-necked religionists make no allowance for these weaker vessels. Every abnormal thought and action is in their eyes the measure of deficient grace, and has no sort of relation to the demonstrated evidence of disease. The legal profession will not admit the existence of these "impulses;" and the general public clamour against the bare suggestion of anything which implies irresponsibility.

It would be well, therefore, if the Legislature could devise some machinery by which ascertained dipsomaniacs might be exiled from a society which they can never ameliorate, and have never adorned.

EDGAR SHEPPARD, M.D.,
Middlesex County Asylum, Colney Hatch.

I am sorry that I really cannot find time at present to write at sufficient length to do justice to the question on which you are kind enough to ask my opinion. Moreover, the subject has already been very fully written upon, so much so that there is little left to be said. I certainly believe there is a real disease, Dipsomania, which is quite a different thing from habitual drunkenness, though there may be a border-land between the two, where it would be difficult to draw the line. It seems to me disheartening, after all that has been written on the subject and all that is known about it, to have the question gravely discussed, whether or not there is such a disease as dipsomania; one cannot be surprised that there are people who still dispute the propriety of vaccination.

FRED. W. A. SKAE, M.D.,
Stirling District Asylum.

I believe Dipsomania to be, in the greater proportion of cases, a *disease*. Considerably more frequently so, however, in women than in men. It is at times curable in the latter, but only after long periods of

"compulsory seclusion;" seldom if ever so in women. Drugs, except in the first instance to regulate the bowels and procure sleep, are of but little avail. In my opinion, nothing short of compulsory seclusion is of any use, and the difficulty, as the law stands, in taking early and proper precaution in the first stages of the disease, from the fact of its being considered merely a "vice," renders the recoveries more hopeless, as the patients are seldom placed under surveillance until the brain has become hopelessly affected.

E. Sparshall Willett, M.D.,
Wyke House, Isleworth.

ON CROUP.

By Edwards Crisp, M.D., a Vice-President of the Association and of the Pathological Society of London, late Physician to the Metropolitan Dispensary, &c.

(*The Essay to which the Fothergillian Gold Medal of the Medical Society of London was awarded in* 1872.)

"RES NON VERBA QUÆSO."

PREFACE.

I have accidentally seen that the Fothergillian Medal is to be awarded by the Council of the Medical Society of London for the best Essay on this subject, and as I had an opportunity of seeing much of this disease, and of making several autopsies during the early part of my practice, I at once determined to compete for the prize, believing that if I did not succeed in gaining it, my labours would not be altogether fruitless; that a more extended investigation of the subject in all its bearings and relations, might lead to some good, and tend especially to my own benefit and enlightenment.*

Unlike the generality of essayists I write this preface before I commence the investigation, which will embrace the following divisions.

(1) History of Croup, with a brief review of diseases new to this country; and on the increase, decrease, and extinction of other maladies in the United Kingdom.

(2) Symptoms of Croup.

(3) Pathology, including drawings of the disease and of analogous diseases in various stages.

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* This Essay, with the exception of some mistakes of the copyist, is published without alteration. The names, which were omitted for obvious reasons, have been supplied, and new matter is added in the form of after-notes only. The essay was illustrated by fourteen drawings by myself of croup and its allied diseases, which can be seen in the Library of the Medical Society of London by those interested in the subject.

(4) Etiology, including climate, soil, temperature, age, sex, &c.

(5) Diagnosis.

(6) Is there a similar disease, or any affection analogous to it, amongst the lower animals?

(7) Diphtheria.—Are Croup and Diphtheria the same disease, or modifications of the same disease? including evidence obtained from my own experience, from friends in large practice, and from statistical records in the United Kingdom, and in other countries.

(8) The treatment of Croup, including the operation of tracheotomy.

(9) A general summary of the above.

As my motto implies, my object will be, to confine myself to subjects of practical import, and to avoid as much as possible the introduction of irrelevant matter.

One main object in this essay will be to enter into the question of the identity of croup and diphtheria. Is diphtheria a modification of croup?—the same affection under a different aspect, or is croup essentially a distinct and separate disease? In endeavouring to determine this question I shall bring statistics to my aid as much as possible—to draw my inferences from a large number of data, and to point out the fallacies that may arise from such deductions. This leads me to say a word or two on the value of medical statistics. It has been said that "anything can be proved by these means," but I may remind the reader that all our knowledge is statistical; that the man who prides himself upon his success in any particular mode of treatment depends upon the record of his own experience, often a very fallacious one. Let me give a recent illustration. A friend this morning was abusing statistics and the fallacious deductions often drawn from them, when the conversation turned upon the treatment of small-pox. He believed, "that he had saved lives and also a great amount of 'pitting' by a generous diet and a plentiful amount of stimulants, and that this was the best treatment of the disease." On pressing him as to the number of cases so treated, he confessed to three. So that he, like many others, used statistics by units, but would reject them by thousands. But my own ignorance respecting the disease of which I am treating is the best argument in their favour. Before I commenced this enquiry I believed that what I have called "genuine croup" has greatly diminished of late years, and I drew this inference because I, and about twenty friends to whom I had put the question, had not seen a case of croup for the last twelve years. The fallacy of this con-

clusion, which could only be corrected by statistics, will be seen hereafter.

But a more potent argument may be given, I think, to show the benefit of statistics than that already adduced. Trousseau, (from whose opinion many in this country shape their views,) in his *Clinical Medicine*, 1868, vol. ii., p. 586, said to his class, "Gentlemen, you all know that croup seldom occurs before the age of two years." But it so happens that in this country more cases are registered before the age of two years than after that period, as my statistics in a following page testify. One of two conclusions is inevitable—either Trousseau's statistics are very faulty, or the disease in France is not the same as that in England.

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ON NEW DISEASES, AND ON THE INCREASE, DECREASE, AND EXTINCTION OF OTHER MALADIES.

As there is much difference of opinion as to the identity of croup and diphtheria, and as this question will form an important and leading feature of this essay, it will not be inappropriate, I think, to take a brief survey of the changes that have taken place in the form and character of many diseases since the commencement of the last

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* After-Note.—For further information upon this subject I refer the reader to the article Croup, in the *Nouveau Dictionnaire de Médecine et de Chirurgie Pratiques*, 1869, by Jules Simon, which I had not seen when my Essay was written. A few only of the above references are mentioned by Simon. The above is a very incomplete account of the bibliography of these diseases, but a longer notice would occupy too much space.

century. Within my own recollection, I have reason to believe (with others) that a great difference has taken place in the character and type of many diseases. Sthenic and inflammatory affections were more common forty years since, and the lancet, too hastily abandoned, was more frequently required than at present. Pleurisy and pneumonia, I believe, were comparatively frequent, and, when seen early, generally yielded to prompt bleeding and to the antiphlogistic treatment. At the present time I rarely meet with acute pleurisy, and so with many of my friends in large practice.

Let me first speak of the disease under consideration—Croup.

From Willan's Tables, in 1796 twenty-two died in London of croup, twelve in 1797, fourteen in 1798, sixteen in 1799. According to the Annual Register, 1808, the deaths from croup in London were seventy-six; from sore throat, nine; from quinsey, three. In 1809, croup, eighty-one; sore throat, seven; and quinsey, three. At this time the population was probably about one million.

In estimating the value of these early reports, it is necessary to bear in mind the imperfect manner in which they were collected, and the comparative trustworthiness of the diagnosis.

In the valuable work in the Society's Library, *Dr. W. Heberden on the Increase and Decrease of Different Diseases*, 1801, croup is not mentioned; but there are some practical facts that have an important bearing upon this inquiry, viz., on the increase, decrease, and extinction of certain diseases in this country. I have carefully read the work, and append a very brief summary of the leading facts, as stated by Heberden. At this period the Bills of Mortality were very imperfectly kept, and the great parishes of Marylebone and St. Pancras were excluded, besides the burials in other places. A comparison, however, of the most fatal diseases during the eighteenth century and those of the present time cannot fail to interest the medical reader. In 1767 "it was required by Act of Parliament that all parish infants should be sent into the country in three weeks after their birth, to be nursed there until they were six years old; after this there was a remarkable decrease of those reported to die under two years of age." The decline of dysentery, bloody flux, colic, and gripes, is most remarkable. Taking decennial periods from 1700 to 1800, the subjoined number of deaths occurred annually:—1070, 700, 350, 150, 110, 80, 70, 40, 20. In the seventeenth century the annual mortality from these causes was never less than 1,000; in some years the deaths exceeded 4,000, and the fatality

from these diseases was also great, in the country. In the first thirty years of the eighteenth century the deaths from small-pox were seventy-five per thousand. During the last thirty years of this century, before the introduction of vaccination, they amounted to ninety-five per thousand. More persons died after the practice of *inoculation*. Apoplexy, palsy, and sudden death (1800) are said to have gradually increased, so that the mortality from these was double that of one hundred years before. "Tea, and the abuse of spirituous liquors," were assigned by some as the causes.

In the deaths from measles there was a remarkable fluctuation; sometimes amounting to one-thirtieth of the whole number of deaths, and at other times falling short of one in four thousand. Scarlet-fever and malignant sore-throat, it is thought, were often by the ignorant mistaken for measles. When Dr. Price constructed his tables of the probabilities of life, 1759 to 1768, the excess of the burials over the christenings at that time amounted to nearly one-third. The most remarkable extinction of disease was that of the plague, which nearly disappeared after the great fire of London, 1666. In this year, 1,998 persons died of this disease in London; in the following year thirty-five, and the year after that fourteen; since which time the number never exceeded five. It is last named in the Bills in 1679.

I have quoted the above for the purpose of showing the great changes that have taken place in the nature and prevalence of certain diseases, which changes are not due *entirely* to better sanitary regulations. The state of London, as shown by Maitland and other writers, was filthy beyond description, and the destruction of some of the worst places by fire no doubt tended to produce great sanitary improvements; but still, several parts, even within the recollection of many living, were bad enough to engender or propagate the plague and fevers of a malignant type, and Glasgow, Edinburgh, and Liverpool have been even in a worse condition.

Ague, as stated by Sydenham, assumed in London an epidemical form; scurvy was prevalent, and often fatal; spotted-fever, jail-fever, and dysentery, destroyed a great number of people. The last-named often described as "bloody flux" and "griping of the guts."

According to the yearly Bills of Mortality (Heberden, p. 42,) in dividing the century into three periods, the following causes of death stand thus:—

DISEASES.	BEGINNING.	MIDDLE.	END.
Abortive, Still-born	600	570	750
Colic, Flux, Gripes	1100	135	20
Consumption.....	3000	4000	5000
Dropsy	850	900	900
Evil	70	15	8
Fever	3000	3000	2000
Gout	26	40	66
Lunacy	27	75	70
Palsy, Apoplexy	157	280	300
Small-pox.....	1600	2000	2000

It will be interesting to compare the above table with that just issued by the Registrar-General for 1869, p. 234, where the most fatal diseases are given *in succession*. I quote them as far as Diphtheria. I need not add the number of each, as this can be readily referred to.

1 phthisis, 2 bronchitis, 3 atrophy, wasting, 4 old age, 5 scarlet fever, 6 convulsions, 7 pneumonia, 8 heart disease, 9 diarrhœa, 10 apoplexy, 11 whooping-cough, 12 paralysis, 13 measles, 14 cancer, 15 premature birth, 16 syphilis, 17 hydrocephalus, 18 tabes mesenterica, 19 dropsy, 20 fractures and contusions, 21 liver disease, 22 brain disease, 23 simple fever, 24 lung disease, 25 cephalitis, 26 *croup*, 27 typhus, 28 teething, 29 asthma, 30 sudden death, 31 enteritis, 32 scrofula, 33 kidney disease, 34 rheumatism, 35 stomach disease, 36 drowning, 37 diphtheria.

These deaths are for the year 1869, when the deaths from diphtheria only amounted to 2,606; whereas in the year 1859 they were 9,587. I have not space to make a long comparison between the diseases of the last century and those of the present time, but it will be seen that, whilst the deaths from phthisis at the beginning of the century were 3,000, at the end they increased to 5,000. Gout, apoplexy, palsy, and small-pox also increased, whilst fever and intestinal fluxes diminished.

There can be but little doubt that phthisis, notwithstanding our better sanitary regulations, is now, as at the period spoken of, on the increase; and the same remark will apply to scarlet fever, brain, heart, and kidney diseases, and cancer.

As regards croup, and the allied diseases, but little comparative information can be obtained. Diphtheria, to the present race of practitioners in this country, is a new disease, and a great many are now practising who have never seen it. Asiatic cholera first made its

appearance in England in 1831, and typhoid fever was recognised in this country in the present century. Influenza,* too, by some is considered a new disease. The thorough investigation of this question would occupy a large volume. I have merely glanced at it in relation to the diseases that will especially occupy my attention, viz., croup and diphtheria.

NEW DISEASES IN THE LOWER ANIMALS.

Among our domestic animals new diseases have sprung up during the present century. Cattle plague and small-pox in sheep again visited us. In 1839 murrain (epizootic aphtha, or foot and mouth disease) was first imported, and in 1841 another imported disease (pleuro-pneumonia) first made its appearance. Splenic apoplexy, and the various forms of charbon, have of late been more prevalent, and our lambs have been decimated in many counties by the worm *Strongylus filaria* in the air tubes, the result partly of over-stocking and bad management.

ON CROUP.

Before I commence my inquiry let me very briefly allude to this disease as Trousseau and many other of the French writers have described it. Trousseau's opinions should always be received with respect and deference, for he has been a hard worker in this field of inquiry, and few men have seen the same number of cases of what he calls "Croup."

But it appears to me that he has not witnessed the same disease as that which is termed Croup in this country, by the great majority of practitioners, nor is it the form of croup described by Home, Cheyne, and the earlier writers. Trousseau, moreover, is profoundly ignorant of English literature, and of the disease as it prevails in England. I give a very brief abstract of his opinions, as expressed in his *Lectures on Clinical Medicine*, published by the New Sydenham Society, vol. II. 1869. I select the English translation, as it is more easily accessible. Trousseau, as is well known, believes that croup and diphtheria are identical diseases; but he makes the important admission (page 499) "that the disease seen by Bretonneau is a very different one to that of the present day."

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* After-Note.—I should have added here purpuric fever, or cerebro-spinal meningitis, two cases of which, strange to say, have occurred in my own practice. One, *Lancet*, 1867, vol. 1, p. 773, and the other recently, April, 1872, *Proceedings of the Medical Society of London.*

After speaking of the old names of the disease (4761), *male in canna* by the Italians, *garrotillo* by the Spaniards, suffocative sore-throat by the Americans, and croup by the Scotch, he goes on to say that "the pharynx is the starting-point, and that pharyngeal croup, the most common, is the typical croup of Bretonneau; that diphtheria, or *mal Egyptiane*, was scarcely known in England for sixty years, although it was a very destructive disease in France.

When deputed by the French Government to investigate the epidemic in 1828 at Sologne, he found that sixteen persons out of eighteen had died in the same house, and that another inmate had given himself up as lost (p. 483); that his colleague Valleix died in forty-eight hours after receiving into his mouth the saliva of a croupal girl, when she was coughing; another colleague died in forty-eight hours after sucking the blood that was passing into the trachea during the operation of tracheotomy for croup; and a third friend, a student of great promise, died in seventy hours after nursing croupal patients. In none of these cases was the larynx affected. He goes on to speak of nasal, aural, vaginal, preputial, and ocular complications, that were entirely unknown to the present race of practitioners in this country, until diphtheria made its appearance a few years since. Home and Cheyne, if they were living, would not have recognised the disease described by Trousseau, of whose opinions I shall have to speak hereafter.

To show the uncertain state of opinion in this country respecting the nature of croup, I need only point to the communications of Drs. G. Johnson, Bree, Laycock, Mackenzie, and Wilks, and those of Mr. Squire in *The British Association Journal* of last year, 1870, vol. I.

HISTORY.

It is difficult, indeed impossible, to ascertain when croup was first recognised. Martin Ghisi described it in Cremona in 1749, and others must have seen it long before that time. As is well known, Dr. Francis Home, of Edinburgh, wrote the first treatise upon this disease in 1795, *An Enquiry into the Nature, Cause, and Cure of Croup.* Home's preface will give the reader the best idea of the knowledge that existed at this period respecting the disease. After speaking of the better classification of diseases, he says, "There is one disease that has entirely escaped all regular examination, and concerning this there was little to be learnt by enquiry, and still less from books—I mean the Croup. I have

never seen anything written on the subject except a 'Thesis,' where the author gives us no facts, and classes it among the spasmodic diseases, to which it has no resemblance in progress and cure (*catarrhus suffocativus* of Etmuller)." Dr. Russell, in his "Economy of Nature," describes a disease very similar; but it seems not exactly the same, as it was attended with ulcers about the larynx, and terminated often in sphacelus of the lungs. Probably it has existed, more or less, in all ages; for the same productive causes must have existed formerly as at present. Children are most subject to it after weaning. Home had never seen it after the age of twelve. "It was local in its habitation, and never found at any great distance from the sea-shore; less frequent in Edinburgh than in Leith or Musselburgh; often along the coast of Fife; also along the coast of Ayrshire and Galloway; although I never heard of it along the neighbouring coast of England, yet probably it is to be found there."

I quote Home's first case, because I think it contains a matter of great therapeutic interest. During the last thirty years the fear of losing blood has so predominated among the majority of the members of our profession, that it can scarcely be credited, that a child only fifteen months old could bear the abstraction of ten ounces of blood in twenty-four hours, the application of four leeches, the orifices kept open for four hours, a blister to the throat, and that the patient would be convalescent on the fourth day! There is not the slightest reason to doubt Home's testimony.

Case I.—"March 15th.—I was called to Miss ——, æt. fifteen months, of an inflammatory constitution, and living within a quarter of a mile from the sea-shore. The day before she appeared duller and hotter than usual. This morning she was attacked with a difficulty of breathing. Her pulse was strong and about 135; five ounces of blood were immediately taken from her; after which she was seized with a sharp stridulous voice, which I can resemble to nothing more nearly than the crowing of a cock, and which is the true diagnostic sign of the disease.

"She had a quick and high breathing, and unusual heat on her forehead and palms of her hands. Her feet and hands were swelled, and had an œdematous appearance. As her pulse was still strong, five ounces of blood were again taken from her, which seemed to ease her greatly. The steam of warm water and vinegar made her spit up, and did her service. Her belly was kept constantly loose with *magnesia alba*, and that night a blister was applied round

her neck. On the third day she was a little easier, but the voice still remained shrill, the breathing high, and the pulse strong. At night four leeches were applied to her throat, and the orifices constantly fomented with warm water; continued bleeding for four hours." Home remarks next morning, "that all the symptoms went off. In this case the repeated bleeding, especially the local one, with internal and external fomentations, did most remarkable service. I was not so certain about the effects of the blister."

Home's suggestion for the performance of tracheotomy, I will speak of hereafter, when treating upon that operation.

ANATOMY AND PHYSIOLOGY.

Before I describe the symptoms of true croup, let me note some anatomical and physiological points that should be borne in mind by the enquirer. The par vagum and its branches should not be lost sight of, when enquiring into the causes; for croup not unfrequently has followed a hearty meal, especially of indigestible food. I have met with four examples of this kind in my own practice, and I have heard of several among my medical friends. The comparatively small size of the epiglottideal opening and of the larynx and trachea are also matters worthy of note, as well as the increased size and the decline in bulk of the thymus and thyroid glands. The change of voice, too, at puberty shows that some hidden influence exists, with which we are at present unacquainted.

SYMPTOMS OF CROUP.

Although these are fully described in all works on the practice of medicine, and in most essays upon the subject, it will be well, as I enter fully into a comparison between the two diseases, croup and diphtheria, to include a sketch of the symptoms, which I do from my own observation.

This disease sometimes comes on very suddenly and without warning: a child goes to bed apparently in perfect health, awakes with a croupy cough, quick pulse, high fever, suffused countenance; the breathing becomes quick and stridulous, effusion of adventitious membrane rapidly takes place in the larynx and trachea, and death may occur in eighteen or twenty hours. I have seen two instances of this description, and the table of cases affords several examples. This acute form generally appears in children from ten months to two years of age. Goelis mentions a case where a child, after having been exposed to a cold wind, died of croup in fourteen hours. In

such examples, the effusion of lymph takes place so rapidly, that they are little available to treatment. In the majority of instances, however, the child is indisposed for a day or two, sometimes for four or five days, with slight fever and hoarseness of voice, which soon becomes croupy, the voice having a metallic ringing sound which ends in a crowing noise. The fever is high, the pulse quick and irritable, the eyes suffused, the face flushed, the countenance anxious, and the breathing quick.

As the disease advances and the air tube becomes more narrowed and obstructed, the symptoms increase in gravity; the child speaks in a whisper, puts its hands to the larynx, sits up in the bed, throws the head backward, clutches with the hands which are often elevated, the breathing is more difficult and noisy, the countenance anxious, and often livid, the eyes staring, and at last all the symptoms denote impending suffocation. Of all the distressing sights that it is the lot of the medical practitioner to witness, there are few so "heart-rending" as that of a strong healthy child literally strangled, and which he is too often without the power to save. The wonder is that tracheotomy, although too frequently of little avail, was not performed before, for this distressing malady, for the symptoms unequivocally indicate its nature; unhappily the affection in many instances is not confined to the larger air tube, the same adventitious deposit extending into the smaller bronchi, blocking up their cavities and depriving the lungs of air. Suffocative attacks take place at intervals, the hands and feet become cold, and the child dies asphyxiated. In these attacks, probably spasms of the glottis play an important part in the suffocative action.

The symptoms of croup are tolerably uniform, especially in the acute form, where this pseudo-membranous product is rapidly developed. In other instances, where the case is more prolonged, and where remedies have time to operate, the spasmodic attacks of suffocation, the restlessness, dyspnœa, crowing sound, anxiety of countenance, and partial loss of voice, become less marked, and the child gradually recovers.

In some instances a child may have symptoms of croup which quickly subside, and then, after a longer or shorter interval, the disease is renewed or increased in intensity. I have seen two cases of this kind, and similar ones are described by different authors.

I need not tire the reader with the recital of numerous cases. Of twenty I have taken notes: of others, which I have seen in my own practice and in that of medical friends, I have taken no

account. Besides these, I could enumerate many examples of *incipient* croup, as I believe, cured by early and prompt treatment. The following practical summary will suffice.

Of these twenty cases, all were under eight years of age; in most, the attack was sudden and without much preliminary warning; several occurred in the night. All were treated by emetics, small and frequent doses of calomel, and, in some, combined with antimony and ipecacuanha; leeches were generally applied to the throat; and in two cases I bled from the arm; one child died, the other recovered. Hot stupes and fomentations to the throat were applied, and the warm bath sometimes used. Of these twenty children, seven died. In five, I opened the trachea; but three were in *articulo mortis*, the opening in these was made between the cricoid and thyroid cartilages. In two, the upper rings of the trachea were divided, and in one, a single tube introduced.

Of the six examined after death, only one had the disease in the larynx and trachea; in the other five, the membrane, in a pultaceous form, extended to the bronchial tubes, and tracheotomy at a late period could have been of no avail.

During life, unfortunately, I did not in any case examine the appearance of the fauces and tonsils; in the fatal cases, no minute examination after death was made of these parts, the question never occurring to me that the disease began above the glottis, as supposed by Bretonneau and Trousseau. The cavities of the heart were not carefully inspected.

PATHOLOGY.

This need not occupy much space, as the lesions are quickly told. Inflammation of the lining membrane of the larynx and trachea, often extending to the bronchial tubes, and not unfrequently attacking the basal and inner part of the epiglottis, followed by a greyish white leathery kind of deposit in the large air tube, and having a more pultaceous, puriform character, in the smaller cylinders. The deposit varies in thickness and tenacity; sometimes it is thin and easily torn, in other examples it is more tough and tenacious; it never adheres firmly to the mucous membrane, as is often the case with diphtheritic deposit. Sometimes, as in Plate III, it is confined to the upper part of the larynx.

The microscopic characters are shown in Plate XIV, as well as those of the diphtheritic membrane; there is not much difference between them under the microscope, and their chemical composition

is said to be the same. As will be seen in Fig. 1, Plate XIV, the membrane consists of a slightly fibrillated fibrine, with epithelial cells and pus globules. In diphtheria (Fig. 2) the epithelial cells are more abundant; but different observers are not quite in accord upon this point. In the series of fourteen plates attached to this essay, my object has been to show, by my own drawings from nature, the pathology of croup in various forms, first by way of contrast with that of diphtheria. For the same reason I have appended the following table of croup specimens, most of which I have examined in various museums, so that the reader may compare it with the table of diphtheritic cases.

As is well known, Dr. B. W. Richardson "believes that, in some cases of croup, fibrinous clots take place in the right side of the heart, and that death begins at this organ; that the dyspnœa arises from want of blood in the pulmonary capillaries, and hence the pale skin, blue lips, and irregular action of the heart; and that the diagnosis in such a condition is most important, especially as regards the operation of tracheotomy." In my own examinations I failed to make a careful inspection of this organ, the heart, and I am afraid the same confession must be made by most of those who have made autopsies in croup. Mr. H. Smith (*Medical Times and Gazette*, 1856) recognises the importance of this guide, and some American physicians have also pointed out its value. It is a matter that requires the careful attention of all pathologists.

TABLE OF SPECIMENS OF CROUP.—(MUSEUMS.)*

AUTHORITY.	Sex.	Age.	Duration.	SYMPTOMS AND PATHOLOGY.
Edin. College Surg. Museum				
p. 1264	child	..	..	Larynx and trachea stuffed with false membrane.
p. 1265	child	..	..	False membrane in larynx and trachea; effusion into lungs.
p. 1290	child	..	..	Cavity of larynx nearly plugged with false membrane.
p. 1291	M.	8 yrs.	44 hs.	Larynx completely clogged with false membrane.

*After-Note.—In the above table, the sex is often omitted, the patient being described as a child or infant. The duration of the disease is likewise omitted in many instances; but I have inserted it where named, for the purpose of comparing the duration of the two diseases, viz., croup and diphtheria.

Table of Croup Specimens, continued.

AUTHORITY.	Sex.	Age.	Duration.	SYMPTOMS AND PATHOLOGY.
Bell's Surgical Obs. 1295 vol. I. p. 17	..	..	..	Tracheotomy; effusion into lungs, membrane lining larynx swollen and inflamed.
1298 vol. I. p. 18	..	..	..	Inflamed epiglottis and membrane of larynx; parts thickened and covered with layers of coagulable lymph.
Museum, Dub. Coll. of Surg.				
Mr. Houston 1	infant	..	36 hs.	False membrane in the larynx, thin and delicate.
SirH. Marsh 2	child	..	22 hs.	False membrane in larynx and short way into trachea.
Mr. Gregory 3	infant	..	18 hs.	Thick yellowish non-adherent membrane.
Dr. Houston 4	..	..	..	Membrane in larynx about half an inch below cricoid cartilage.
5	child	..	..	False membrane on epiglottis to the commencement of the trachea.
Mr. Stokes 6	..	..	very early death.	False membrane almost confined to the back of the epiglottis.
Dr. Gordon 7	child	..	..	Lymph effused in scattered patches.
8	child	..	..	Lymph sparingly effused.
Mr. McDowal 11	child	..	52 hs.	Lymph extends into the lungs in a tubular form, scattered patches above.
Mr. Colles 13	..	8 yrs.	..	Copious effusion of lymph in larynx and trachea.
Dub. Coll. of Surg. Museum				
p. 12	adult	.	..	From the lips of the epiglottis to the smaller bronchial tubes, the passages choked with lymph.
p. 14	child	..	..	Larynx and trachea lined with a thin layer of adventitious membrane.
p. 15	infant	..	few hours	Fine thin layer of lymph spread over the mucous membrane.
Museum, Fort Pitt p. 437	child	..	..	Thick lymph extends on posterior part of tube to within a quarter of an inch of the bifurcation of the trachea.
p. 440	..	..	..	Lymph on larynx and trachea very thick, of a dark colour, with elevations on the surface.
St. Thos. Hosp. Museum.				
p. 12	child	..	..	Several shreds of false membrane adhere to the mucous membrane of the larynx.
p. 13	child	..	..	Epiglottis and larynx covered with lymph, also the trachea.

Table of Croup Specimens, continued.

AUTHORITY.	Sex.	Age.	Duration.	SYMPTOMS AND PATHOLOGY.
St. Thos. Hosp. Museum.				
p. 14	child	..	..	Larynx and trachea lined with false membrane.
p. 15	child	..	..	Larynx, trachea, and the primary bronchi covered with false membrane.
p. 16	child	..	..	Similar to the above.
p. 17	child	..	..	Larynx, trachea, and larger bronchi lined with a continuous layer of lymph.
p. 20	..	..	..	Tonsils and mucous membrane of larynx and trachea covered with lymph, also most of the bronchial tubes. (January 10th, 1859.) This is probably a case of diphtheria.
Langstaff's Museum.				
p. 698	child	..	5 dys.	Lymph along lining membrane of larynx, and small portion of trachea slightly adherent; lining membrane of trachea and bronchi inflamed, but no lymph. Langstaff observes that "this child's life might have been saved by tracheotomy."
p. 699	boy	6	5 dys.	Membrane covered larynx, trachea, and bronchial tubes; lungs consolidated.
p. 700	F.	3	3 dys.	Appearances similar to the above; lungs consolidated.
p. 701	M.	6	..	Croup after pneumonia; trachea and larynx covered with coagulable lymph, which adhered firmly; bronchial tubes filled with pus and mucus.
St. Geo. Hosp. Museum.				
p. 94	child	..	..	Soft yellow fibrine on the surface of the trachea, more abundant below inferior vocal cords.
p. 95	child	..	..	A similar specimen.
Guy's Museum				
p. 1694 51	girl	17 ys.	..	Larynx covered with delicate false membrane.
p. 1694 55	boy	16	..	Delicate false membrane in the larynx.
p. 1692	infant	..	..	Epiglottis, larynx, and trachea covered with false membrane.
p. 1692 25	child	2 yrs.	3 dys.	Larynx and trachea covered with false membrane; mucous membrane under croupous layer red and inflamed, also in bronchi.
p. 1692 50	F.	..	5 dys.	Trachea, layer of false membrane; larger air tubes filled with thick mucus.

Table of Croup Specimens, continued.

AUTHORITY.	Sex.	Age.	Duration.	SYMPTOMS AND PATHOLOGY.
Guy's Museum p. 1693	infant	36 hs.	..	Larynx and trachea covered with thick false membrane.
p. 1693 50	F.	4 dys.	..	Thin, croupous membrane lining the larynx.
p. 1694	child	..	..	The same nearly as the above.
St. Barth. Museum. p. 6	child	..	..	A thin layer of lymph extends from the under surface of the epiglottis to about half an inch below the cricoid.
p. 11	child	..	..	A thin and very delicate layer of lymph lining the trachea, larynx, and main bronchial tubes.
p. 15	child	..	..	Larynx, trachea, and bronchi covered with an abundant, but not continuous deposit of lymph. Tracheotomy.

It is especially worthy of note, that in one specimen only—St. Thomas's, in 1859, when diphtheria was so prevalent—is anything said about adventitious membrane in the fauces, and here the patient's age is not mentioned.

This table is necessarily imperfect; because in museum catalogues, and in case books, frequently an abridgement only of the case is given, and that often very imperfectly; still, I think the specimens afford in a *comparative* sense much useful and practical information. Of the above examples, all are under puberty, and in the instances adduced in the adult, the symptoms and progress of the disease, as I have said before, do not generally correspond with those in the child.

The pathological deductions, however, are of more interest. In no example was the false membrane above the glottis. In a few cases the tonsils were more or less swollen, but in the great majority they were unaffected.

In the majority, the false membrane was not confined to the larynx and trachea, but extended into the bronchial tubes in a less tenacious form; a fact of great practical importance, when estimating the probable success of tracheotomy. It must be borne in mind, too, that frequently no proper examination was made of the smaller air-tubes, and hence the cases to some extent lose their practical value, when estimating the success of tracheotomy. It must be

remembered also, that nearly all these specimens are free from diphtheritic complications, as the preparations were "put up" before this disease (diphtheria) was recognised in this country.

DIAGNOSIS.

The young practitioner might mistake croup for some other disease; but those who have seen a few cases could scarcely commit such an error. Sometimes a kind of catarrhal congestion takes place in the larynx, attended with a hoarse voice, that I believe has not unfrequently been mistaken for croup. One form of whooping cough, and the hoarse cough of measles, too, it is said have led to the same error.

Laryngismus stridulus, a nervous affection depending upon spasm of the laryngeal muscles, has likewise been put down as croupal, but such an error must be very transient.

Of all the maladies likely to be confounded with this disease, diphtheria is the one that has occasioned the most confusion, and some cases of croup have probably been registered under this head; and *vice versâ*.

In the chapter on Diphtheria, notwithstanding the opinion of many continental physicians of eminence, and of some also in this country, I think I have succeeded in showing the non-identity of the two diseases; and that, in most particulars, there is a wide line of demarcation between them.

ETIOLOGY.

Both Home and Cheyne believed that croup was almost confined to the sea coast; but at the time they wrote, no available statistics were obtainable; and indeed the disease was scarcely recognised. Croup is quite, or almost, as prevalent in many inland districts, as will be hereafter shown, as it is near to the sea, and it is difficult to connect it with soil or locality in England. "It is said to be much more prevalent in the northern countries of Europe; and that it rarely prevails in the south," but of this we want better evidence.

The prevalence of east or north-east winds has also been assigned as a common cause; but upon this point, too, more reliable information is needed. I believe that it is more prevalent in cold, damp situations; but I speak guardedly, as my statistics are not completed, and I find it has been sometimes very fatal in high

and dry localities. In five instances, in my own practice, I think I have been enabled to trace it to damp and cold.

Dentition may act both as a predisposing and exciting cause. I believe that I have often seen benefit from lancing the gums at the commencement of croup, in infants and young children.

Sex.—In all the returns I have obtained, as the statistics show, it is more prevalent in the male sex. Probably after a certain age, greater exposure to change of temperature in boys, may be the explanation, but why it should apply also to infants of one year it is difficult to divine.

Age.—Croup rarely occurs after the age of puberty, and as I have said in the chapter on Croup in the Adult, the cases called "croup" will generally be found, when fully investigated, to be incomplete, as regards some of the symptoms.

Taking the number of cases of croup for ten years in the metropolis, I find the ages were as follows: under one year, 666; one year, 1116; two years, 2093; three years, 859; four years to five, 512. Above this number, comparatively few.

Hereditary Predisposition.—Some believe the disease to be hereditary; but of this we lack sufficient evidence. It certainly prevails more in certain families, as I have sometimes seen, and it may occur several times in the same child, a fact that has often been verified. Barthez thinks that "children predisposed to croup are weakly and have a tuberculous taint;" but I have seen it prevail among the strongest and most robust children. Barthez, like Trousseau, has probably seen a different type of the disease from that prevailing in this country.

Croup is found in all European countries, on the continent of America, and in all our colonial possessions. As regards its occurrence among the black races of Africa there is but little reliable information.

In New York in 1854, 680 deaths occurred from croup. In Philadelphia from 1844 to 1848, 756. In the annual Report of the State Board of Health, Massachusetts, 1871, in Boston, it is said that 125 persons died of croup, 22 of these were over twenty-two years of age.

STATISTICS OF CROUP IN THE UNITED KINGDOM.

As I have stated at page 127, in 1796, 22 died of croup in London; 1797, 12; 1798, 14; 1799, 16; 1808, 76; 1809, 81.

But let me make an extended analysis of the Registrar-General's

Reports, from their commencement in 1838. And first of London. From 1838, the death-rate annually in the metropolis has been, 354, 322, 375, 391, 438, 390, 411, 352, 277, 295, 291, 324, 307, 315, 307, 339, 361, 402, 485, 548, 540. From 1861 to 1869, beginning with the first-named year, 639, 689, 629, 639, 515, 508, 501, 471, 379; total 4987, of which I find 2760 were males, and 2227 were females.

In England and Wales, beginning with 1838, the death-rate annually to 1850 has been 4463, 4192, 4336, 4177, 4457, 3777, 4038, 4322, 4180, 4058, 3660, 3998, 4419.

For the last ten years to 1869, of 4987 cases in London, 2760 were males, and 2227 females, and so in all the returns, metropolitan and provincial, the males predominate.

I find, according to the Registrar-General's last Report 1871, for the year 1869, the cases of croup in the different counties of England were as follows:—

London 384, Surrey 131, Kent 42, Surrey-ex 50, Kent-ex 123, Sussex 61, Hampshire 83, Berkshire 50, Middlesex-ex 36, Hertfordshire 43, Buckinghamshire 21, Oxfordshire 35, Nottinghamshire 47, Huntingdonshire 6, Bedfordshire 15, Cambridgeshire 21, Essex 80, Suffolk 37, Norfolk 56, Wiltshire 40, Dorsetshire 30, Devonshire 114, Cornwall 65, Somersetshire 79, Gloucestershire 77, Herefordshire 14, Shropshire 26, Staffordshire 228, Worcestershire 48, Warwickshire 129, Leicestershire 45, Rutland 2, Lincolnshire 56, Derbyshire 58, Cheshire 112, Lancashire 926, West Riding 510, East Riding 44, North Riding 42, Durham 131, Northumberland 76, Cumberland 43, Westmoreland 9, Monmouthshire 42, North Wales 172, South Wales 81.

In the recent Report, 1871, for the year 1869, the annual deaths from croup in a million persons living were as follows:—1850 to 1854, 225·2; 1855 to 1859, 281; 1859 to 1864, 279·4. For the year 1869, 206 per million.

I have ascertained from an analysis I have made of the Registrar-General's Returns for thirty-eight weeks of the present year, 1871, to September 30th, beginning with January 7th, that the weekly mortality in London from croup stands as follows:—

9, 15, 11, 15, 11, 14, 16, 8, 12, 14, 12, 14, 15, 17, 9, 15, 9, 13, 7, 17, 9, 9, 4, 4, 9, 5, 8, 12, 7, 6, 7, 5, 12, 7, 5, 12, 5, 10, 13,—Total 401.

Age.—All of the above were under five years of age, except 30, and these were between five years and twenty years of age.

For the same period in Dublin, the cases I find were weekly, 2, 1, 1, 1, 3, 1, 4, 2, 1, 3, 2, 1, 2, 1, 7, 1, 3, 5, 4, 2, 2, 1, 1, 1, 2, 4, 1, 1, 2, 12, 1, 1, 3, 4,—Total 71.

Age.—Of these, only 5 were between five and fifteen. The rest were under five.

In Edinburgh, and seven other large towns of Scotland, for the first three months of this year, the number of deaths from croup was, January 36, February 39, March 42,—Total 117.

The statistics of diphtheria in London, Dublin, and Edinburgh, are given in a future page.

It will be seen from the above statistics, that there is great uniformity as to the annual numbers, but that the deaths vary greatly in different localities, as in most other diseases, and that croup, so far from being on the decline, is somewhat on the increase, and, as stated at the conclusion of the preface, Trousseau's assertion as to age is found to be entirely erroneous.

I have not had time to finish the estimate, or to append the map of England and Wales, with the number of deaths from croup in different Unions, as in diphtheria; for I find that to investigate this subject properly, in all its bearings, such as moist or dry atmosphere, density of population, height above sea level, rain fall, prevailing winds, geological formation, &c., will take a vast amount of hard work and patient labour; but I may state the general conclusions I have formed, without vouching for their perfect accuracy.

The number of cases, as in most other diseases, would vary in different years in the same district; but there would be no great variation in the total number for each year, as shown by the general summary. It is difficult to connect the occurrence of croup with the soil, or with any particular geological formation. It is generally more prevalent in large towns; but the cases, as I have said, in different localities vary much in each year, but not in anything like the same proportion as in diphtheria, an epidemic disease, where the number of deaths does not bear a like proportion to those attacked.

TREATMENT.

In croup, less diversity of treatment has been pursued than in many other diseases. Opinions differ as to whether the anti-phlogistic means should be resorted to, or whether a half supporting, half stimulating mode of treatment should be used; but I believe

that the advocates for the last named plan are comparatively few. In the treatment of diphtheria, there is little diversity of opinion upon this *point*. Among the external remedies for croup may be named bleeding, (general and local,) blisters, hot and cold applications to the throat, warm baths, medicated vapours and sprays, solutions of nitrate of silver, tannin, and sulphate of copper.

The internal medicines are calomel, tartarized antimony as an emetic and sudorific, ipecacuanha, purgatives, the alkaline salts, chlorate of potash, quinine, alum, sulphate of copper, sulphate of zinc, diaphoretics of various kinds, and more recently lactic acid, lacto-phosphate of lime, lime water, bromide of potassium, and others. I am incompetent to give an opinion from practical experience as to the utility of most of these medicines.

My own mode of treatment, which I believe has been tolerably successful, is generally the following: lancing the gums if necessary, an emetic of tartarized antimony or of ipecacuanha, leeches to the throat, warm bath, stupes to the throat in the form of a flannel bag filled with bran and dipped in boiling water, and sometimes sprinkled with spirits of turpentine ; from one and a half to three grains of calomel, with sugar, placed upon the tongue every two or three hours, with small doses of ipecacuanha, or tartarized antimony; sometimes mustard poultices or blisters to the throat. The treatment varies according to circumstances, the time at which the patient is seen, and the stage of the disease.

It has been said that calomel can have no rapid effect upon the inflamed tracheal membrane ; but I believe that calomel acts beneficially in this disease, and in some other diseases of children, by its revulsive action upon the intestinal mucous membrane, and not by any direct action upon the part affected. As is well known, some American physicians—Rush, Bard, and Anderson—believed that it arrested the secretion of lymph, and favoured its detachment when formed. If croup were a disease of longer duration, this explanation would be a feasible one, but it is difficult to accept it as applied to acute croup.

Some practitioners trust exclusively to antimony or ipecacuanha, or both combined ; and others, who have fallen into the modern practice of stimulation, would avoid anything approaching to the antiphlogistic treatment. I could quote abundant evidence, or rather opinions, as to the efficacy of certain modes of treatment, but I fail to find any evidence satisfactory enough to lead me to abandon a practice that I believe I have found successful. One

conclusion is tolerably certain, that in many cases of croup, with rapid bronchial complication, no mode of treatment will be of any avail; but I believe a vast number of children may be saved by active and early measures. The mothers of children predisposed to croup should be supplied with emetics and calomel powders, so that no time is lost, as the disease not unfrequently comes on in the night. Two of my medical friends believe that they have saved their own children in this way, and I think that the children of medical men seldom die of croup, owing to the prompt and early treatment they receive.

BLOOD-LETTING IN CROUP.

Now that bleeding is, by many practitioners, not thought to be so deleterious in its effects as it was a few years since, it will not be out of place to devote a short space to its consideration.

In the treatment of croup, as in all other acute affections, it is especially important to bear in mind the stage of the disease. Thus, the treatment that would be proper at the onset, would be highly objectionable at a later period of the complaint. It is the neglect of this important rule, I believe, that has partly brought bleeding and the antiphlogistic treatment into disrepute; bleeding may be very beneficial in one stage of the disease, and highly prejudicial in another. I could quote abundant examples where children have recovered under its use, both general and local. In the commencement of the disease, before the exudative process has gone far, when the fever is high, the breathing quick, and the pulse irritable, I believe that the application of leeches to the throat is beneficial, and, in older children, blood may sometimes be taken from the arm with advantage. I once bled a child who laboured under croup in a severe form, from the arm, ordered leeches to the throat, and gave frequent doses of calomel, and the patient recovered. In another case, I used a similar mode of treatment, and the result was a fatal one.

It must not be supposed that, in quoting Home's first case, page 132, I recommend such heroic treatment. I have rather introduced it to show, that bleeding is not so injurious as many members of our profession would lead us to suppose, and that young children are not easily killed by it. If Home's cases are carefully examined, it will be seen that bleeding was practised largely and indiscriminately, probably to the injury of the patients. Of the thirteen cases recorded by him, nine were fatal, and all

these were bled to a greater or less extent; seven of them from the arm, although they were under eight years of age.

Cheyne, 1801, (who scarcely alludes to the treatise of Home,) was also an advocate for *bleeding*, but he practised it with rather more discrimination and judgment. In a child *sixteen months* old, (Case 1,) he, at an early period, opened the jugular vein, apparently with a good result. A robust girl, twelve years of age, (Case 3,) was bled to five ounces, then to eight ounces, and she recovered.

In connection with the subject of bleeding, let me relate a case mentioned to me by my friend Mr. Barnet of Blackheath. He was requested to see a strong boy who had acute croup, and the case was considered hopeless; there was great dyspnœa and threatened suffocation from adventitious membrane in the larynx, and probably in the trachea. The patient was largely bled from the arm, and from that time the symptoms improved and he gradually recovered. How did this bleeding act beneficially? Evidently it could have no direct effect upon the cause of obstruction, but, by unloading an oppressed heart and congested lungs, it probably saved the patient's life.

Whether croup, now, is of a less sthenic character than formerly. I am unable to say, as we have no reliable information upon this subject. I do not recommend bleeding from the arm, but I think that, in most cases, the application of leeches to the throat in the *early* stages is advisable.

The effects of the "lowering system," spoken of by some tracheotomists, are due probably to the disease, and not to the treatment. I shall speak of the operation of tracheotomy hereafter.

IS CROUP A SPECIFIC DISEASE?

Another question in connection with this enquiry is as to the specific nature of the inflammation in croup. It is difficult and indeed impossible to explain why this disease should appear before puberty, but it must be recollected that certain alterations take place in the size of the larynx and in the character of the voice at this crisis, that are especially worthy of notice. The thymus gland, too, decreases in bulk after this important change, and this may have more to do with the character, and time of access, of the malady than we have hitherto supposed.

Several experiments have been tried to produce croup artificially in the lower animals. Saissy injected acid and water as well

as sulphuric acid, into the trachea of dogs, but failed in producing any false membrane. Valentin tried the same experiments with a like result, adding chlorine gas to the irritants used. Gohrér exposed three horses, a mule, an ass, a sheep, and four dogs for four days to the fumigation of chlorine gas; no croupy membrane was produced; in some, the voice was altered and slightly croupal. Ammonical gas and vaccine matter were also tried. Albers applied to the larynges of horses, cats, and dogs, alcohol, oil of turpentine, bichloride of mercury, and nitrate of silver; hoarseness of voice, sonorous respiration, inflammation of the lining membrane of larynx, and false membrane, being the result. The oil of turpentine and bichloride of mercury seemed to produce the most marked results. Duval (Brest) also produced similar results by the same means.

Jurine, by inoculation of croupal matter from the child, failed to produce any effect upon old animals, but in the young he produced some false membrane, by the inoculation of croupal matter, but not croup. In these, and other experiments tried, nothing like genuine croup was produced I think; although there is no difference in the chemical composition of the croupal product, and very little in the microscopical appearances, between this membrane and that of diphtheritic exudation, whether in the throat or in other parts. I believe that true croup is a specific, non-contagious disease, occurring at an early period of life, before the proper development of the larynx and trachea, and that the condition of the thymus and thyroid glands may have something to do with its production.

IS TRUE CROUP A ZYMOTIC DISEASE?

Croup, as is well known, is placed by the Registrar-General among the zymotic diseases, but let us inquire whether it strictly comes under this category. All the other diseases named, are contagious or infectious, but there is no sufficient evidence to show that croup can be conveyed from one child to another, and certainly like diphtheria, as in many instances, it cannot be conveyed from a child to an adult. In my own practice I have met with three examples where croup has affected two children in the same house; others are on record, where three or four children have been seized one after another, but in these instances, no sufficient evidence of contagion existed. Again, croup may be more prevalent in a certain district, and may be unusually fatal; but, if the statistics

are referred to, it will be found that the number of cases each year preserves a curious uniformity, and clearly shows it does not in this country assume an epidemic character, like diphtheria and other blood diseases.

If we look to the statistics of pneumonia, pleuritis, pericarditis, or cephalitis, we shall find that the numbers vary quite as much in these diseases, or even more, than in genuine croup. I am aware that epidemics of croup have been described, but I believe, if they are carefully investigated, it will be found that they partake more of the character of diphtheria. On the American and European continents, judging from a great many authors that I have consulted, there is a kind of bastard croup, attended with adynamic symptoms, often with faucial deposit, that should be classed with diphtheria; it does not resemble true croup, which I believe is confined exclusively to the air tubes, and is not strictly a zymotic affection.

THE FUNGOID THEORY OF CROUP.

Many have believed in the fungoid origin of croup and diphtheria; Letzerich, Hellier, and many others. Recently, Professor Laycock of Edinburgh (*Medical Times and Gazette*, 1871) has inclined to this theory; but I fail to find any evidence to warrant the inference that croup or diphtheria arises from this cause. A gentleman who had much experience at the London Zoological Gardens tells me, that "he has seen this fungus (*odium albicans*)* in several instances in the chest and abdomen of birds, upon thin layers of croup-like membrane connected with the air cells, and therefore exposed to the external air. But this was rather the consequence, than the cause; fungus is often generated in parts that have lost, or are losing, their vitality, and I think it would be as fair to assume that the mould upon a decayed apple is the cause of the rottenness, as to infer that the *odium* produces croup or diphtheria.

There is, however, another theory that I have long entertained, and others likewise have advocated it, viz., that a living specific germ, the recognition of which is beyond our ken, may be the cause of diphtheria, and other blood diseases (so called), but this I believe does not apply to croup, an inflammatory disease, the result of inflammation occurring at an early period of life, and influenced perhaps by the peculiarities of certain organs contiguous to the structure affected.

* After-Note.—I have seen this frequently, and was the first to describe it.

DOES TRUE CROUP PREVAIL AS AN EPIDEMIC?

In this country I have not been able to find any example of epidemic croup (so called), although both upon the American and European continents such epidemics have often been described; but I believe these are for the most part examples of croupal diphtheria, commencing in the pharynx. The evidence I adduce should surely be convincing as regards this country, as shown by a careful examination of the Registrar-General's Report for ten years. I have gone over the six hundred and twenty-three unions, and noted the cases in each county. In the decennial supplement, 1850-51, croup is not named, and I learn from the Registrar-General that it is placed among "other zymotic diseases," so that I have been obliged to make a summary of the annual reports.

It is true that in some localities croup, without any assignable cause, is more prevalent and fatal at one period than another, but the same remark will apply to pneumonia, bronchitis, and all other non-contagious diseases, as I have abundantly verified. Diphtheria affects thousands often in the same district, and, like cholera, when once located in a country, is uncertain in its march and capricious in its selections.

CROUP IN THE ADULT.

There is but little doubt that croup, or a disease very similar to it, may occur in the adult, as mentioned by Frank, Cheyne, Stoll, Sachse, Pobal, Keir, Thelenius, Stock, and Hopelink.

Bricheteau mentions fourteen authors who believe that croup does not occur after puberty, and this opinion has been shared by Stokes, Porter, and others.

I have paid a great deal of attention to this question, and I have examined all the preparations I can find in the pathological collections of this country. I have examined various cases on record, and I have come to the conclusion that genuine croup rarely or never occurs after the age of puberty. If the recorded cases are carefully examined, it will, I think, be found that some links in the chain of symptoms and morbid appearances are wanting to connect the disease with true croup. Among the interesting preparations (1842) in the Hunterian Museum, is one of which I have furnished a drawing (Plate 6). The patient was a lady seventy-three years of age who had signs of croup for ten days, and she is supposed to have died from tearing of the membrane during a violent fit of coughing; she

moreover coughed up a thread of membrane five inches in length four days before her death. The membrane was present in the larynx, trachea, and bronchi, and in the larger air-tube it formed a perfect cylinder. The state of the fauces, however, is not mentioned. In Guy's Museum is another example, prep. 1796.

In the Edinburgh Museum College of Surgeons, Table 4, pps. 1293, 1295, 1296, 1298, are supposed also to be examples of croup in the adult. In the Museum of the Dublin College of Surgeons, prep. 12, and in St. Thomas's Hospital, pps. 18, 19 and 20, are examples of thin fibrinous deposit in the larynx of adults, and in the late Mr. Wagstaffe's Museum were two preparations, 697 and 703; the last called chronic croup.

It should be remembered that in laryngitis there is generally a thin, adventitious deposit formed; but it does not present the appearance of croupal membrane.

Cheyne, p. 69, mentions a case by Dr. Rolls, but the tonsils were swollen and covered with a thick membrane of coagulable lymph. In the last volume of the Pathological Transactions, vol. XXI, p. 44, is an example recorded by Mr. Porter. A man, forty-three years of age, caught cold a second time within a period of ten days, had a "heavy cough and quinsey," to use his own words, the respiration was croupy, and he brought up a large portion of membrane; the inside of the mouth was of a darker hue than natural, but the fauces were free from adventitious deposit; he died in six days from the second attack. The urine during life was free from albumen, but that examined after death contained one-fifth. The trachea with the false membrane *in situ* was exhibited. The author thought this to be a case of croup, but, as stated by the editor, the *generality* of members believed it to be one of diphtheria, (p. 45.)

BRONCHIAL CROUP.

In Plate IX, I give the drawings of bronchial fibrinous casts that were expelled during life, by a patient under my care; such casts were frequently ejected. Our pathological museums contain numerous specimens of this kind, that, judging from the condition of the lung and bronchial mucous membrane, are of much slower formation than that of the false membrane in croup.

Other parts of the mucous surface, as the bladder, intestines, uterus, (irrespective of diphtheria,) may throw off a croupal membrane; the larynx too in simple laryngitis may contain adventitious deposit; and so with the same organ after small-pox. I have

seen several examples of these in museums. In Plate XI is a representation of one of the most remarkable examples of the sudden deposit of a croupal membrane along the whole course of the small and large intestines that I have ever heard of. The case, as far as I know, is unique; but bears some resemblance to the one in the Deer, as shown in Plate XII.

Many years since I operated upon a strong healthy gentleman, twenty-one years of age, for phymosis. The day after the operation the wound had a swollen appearance and was somewhat inflamed; slight tenderness was felt about the abdomen, there was a disposition to sickness and diarrhœa, and the patient sunk on the third or fourth day; but I have mislaid the notes of the case.

On a post-mortem examination I slit up the whole length of the intestinal canal, and there was scarcely a surface half an inch square that was not covered with a thin croup-like grey exudation; the lining membrane of the bowels was generally congested. All the other thoracic and abdominal organs were normal. The patient was also seen by the late Dr. Marshall Hall, whom I called in consultation, and he had never witnessed a similar case. I mention these examples in connection with croup, to show that a somewhat similar action may take place in other mucous membranes.

LARYNGITIS.

One English physician, Dr. G. Johnson, (*Medical Times and Gazette*,) thinks that the term Croup should be abandoned, and that Laryngitis, which corresponds to the inflammatory croup, should be substituted; that this and Diphtheria are the only terms needed. But Dr. Johnson cannot have seen many examples, I think, of true croup, where there is a hyperæmic condition of the mucous membrane; a very different appearance to that exhibited in laryngitis.

It is true that a few cases of croup (so called) are on record, where the larynx has been inflamed, and no adventitious product has been present. Such cases I believe are extremely rare, and, when well investigated, will be found wanting in some important symptoms. Let me record an instance, as far as I could ascertain, of idiopathic inflammation of the epiglottis and upper part of larynx, in a boy eight years of age. I examined the body and took the drawing, Plate X, which exhibits the morbid appearances: it will be seen that the inflammation was confined to a small space, and that no adventitious membrane and swelling were

present. The inflammation and swelling were confined chiefly to the epiglottis, as seen in the drawing. A strong robust boy, had a cough, and a hoarse, rather croupal voice, with fever, for four or five days, when suddenly, in the absence of his medical attendant, he became much worse, with symptoms of suffocation and died very quickly. It is tolerably certain that tracheotomy would have saved the life of this patient.

IS THERE A SIMILAR DISEASE OR ANY AFFECTION ANALOGOUS TO CROUP AMONG THE LOWER ANIMALS?

I believe that there is no disease in the lower animals that can be strictly called True Croup. In several species of foreign birds I have seen several isolated examples of a croupal sound during life, and of a soft exudation, composed chiefly of epithelial cells and pus globules, in the trachea after death. I have had an opportunity of watching this disease in my own poultry. In Plate XIII is shown an example of this form of croup which attacked several chickens about two-thirds grown. It appears to depend upon a hyperæmic condition of the tracheal mucous membrane. As is well known, the voice of a bird is seated in the larynx, at the end of the trachea, in the chest; so that the croupal sound is generally less marked. The chickens in question were in a small confined place that admitted the rain at the roof. The disease continued often for a long time, and many recovered from it.

Spinola and others have described an epizootic form of aphtha in poultry, but I have never seen this. In the Museum of the Dublin College of Surgeons, prep. 115, are the larynx and trachea of an eagle that died rather suddenly; loose adventitious membrane is in the lower larynx. At Fort Pitt Museum, Chatham, is a similar preparation from the common fowl. At the Pathological Society (*Transactions*, vol. 13, p. 273) Dr. Bristowe showed specimens of doves that had their mouths open before they died: a cheesy mass was found at the back of the hard palate, stopping up the posterior nares. Diphtheria was prevalent in the district. With respect to croup in birds, I learn by letter from Mr. Bartlett, the Superintendent of the Zoological Gardens, the following:—"We frequently have birds (*more especially gallinaceous birds*) attacked by what appears to me to be *croup*, as they exhibit all the symptoms you describe, as croupal voice, rapid breathing, and thick gummy secretions about the mouth and trachea. Many of the fowls and pheasants die from this

state of throat; sometimes the eyes become frothy, and have a sticky discharge."

Among quadrupeds in this country, croup, or any disease nearly allied to it, is very rare. I have seen in pigs poisoned by eating the intestines of an ox that died of splenic apoplexy, inflammation of the throat and fauces, with a diphtheria-like membrane in the larynx. In the deer (*C. indicus*) in confinement, as shown in Plate XII, the whole intestinal tube was covered with patches of lymph-like membrane, but I omitted to examine the air-tubes. Laryngitis in the horse, with œdema about the glottis, is not unfrequently met with; but in these cases no false membrane is present. A mare, that I had an opportunity of seeing with a veterinary surgeon, had inflammation about the upper part of the larynx; the breathing was stridulous and difficult, and suffocation appeared imminent. The trachea was opened, a tube introduced, and the animal's life was saved. At this time she suckled a valuable foal; life was prolonged, but she was never afterwards fit for work. Veterinary records contain several examples of the successful performance of tracheotomy under like circumstances. In the Museum of the Dublin College of Surgeons, prep. 116, are the larynx and trachea of a Wapeti Deer, operated upon by Sir P. Crampton for laryngeal inflammation and obstruction.

Potter and Rush, in America, have described croup in dogs. Double in two lambs and cats (epizootic). I suspect, however, from the description, that the lambs suffered from the *Strongylus filaria* in the larynx and bronchial tubes. Viellard saw croup in a cow; a piece of false membrane was expelled ten inches in length, and the animal recovered. Bowen and Gouzel met with croup in a calf seven months old, a yellow membrane-like coagulated gelatine lined the larynx. M. Coulet describes diphtheria in the ox; a fibrous mass of the size of a pigeon's egg was expelled from the ethmoidal sinus (*Vet.* 1869, p. 611).

In a recent work on *The Practice of Medicine*, 1869, it is said: "Again, if false membrane be artificially produced in the lower animals, false membranes are not exuded; though croup, identical in its phenomena and organized changes with the disease in the human subject, does occur spontaneously in them, as is seen in lambs, calves, puppies, cats, and chickens, constituting the 'pip;' the latter especially often prevails epidemically in a farmer's yard, and produces a large mortality." Nearly all this is entirely mythical; pip is not croup.

ON DIPHTHERIA.

As many men of eminence, especially continental physicians and surgeons, believe Croup and Diphtheria to be one and the same disease, or a modification of the same affection, I shall devote a considerable space to the elucidation of this malady, and in my conclusions point out what I believe to be the important differences. Although diphtheria is a new disease to most practitioners now living in this country, there can be but little doubt that the same malady, or one very similar to it, has existed in England before the present century. If the chapter on Bibliography be consulted, and some of the works published during the last century be referred to, it will be found that the disease has been known under various names, such as ulcerous sore throat, malignant sore throat, *angina diffusa* and *gangrenosa*, *morbus strangulatorius*, the *garotillo* of the Spaniards, and the *diphtheria pharyngea* of the French.

It is said to have occurred in Rome A.D. 380, Holland 1337, Paris 1576, Naples 1618, when it destroyed 5000 people. Other parts of the world have been visited by this disease, or a disease nearly allied to it. During the present century, as shown by the works of Bretonneau, 1826, (before quoted,) it has proved very fatal in some parts of France. In Paris in 1800 and 1807 many fell victims to the disease.

In Boulogne, 1855-56, it occasioned 366 deaths. At San Francisco in 1856, the disease was also very fatal. The tables I have appended to this chapter show how deadly it has been in this country since 1855. In 1849, Mr. J. Brown of Haverford West records 200 cases, 40 of which ended fatally.

I learn from the Registrar General's Office that, before the Supplementary Report 1851-1861, from which I quote largely, diphtheria was classed with scarlatina. In this decennial Supplement, the Registrar General remarks, p. 15, "That the mortality from scarlatina is less by half than it was in the previous age, but it remains much more fatal than small-pox, measles, whooping-cough, and other maladies of this class. Diphtheria, which has now taken its place among the fatal diseases of England, in this respect resembles scarlatina." Unfortunately in this decennial report the deaths from croup are classed among "other zymotic diseases," but in the annual reports they are all registered.

Dr. Camps, in 1858, read a paper before the Medical Society of

London on diphtheria, (*Lancet*, 1858, p. 25,) when he spoke of it as a new disease, and did not appear to be aware that it had been so fully described by Bretonneau and other continental writers.

SYMPTOMS OF DIPHTHERIA.

Diphtheria, like croup, as is well known, occurs more frequently among children, and whilst the latter malady is generally isolated, diphtheria often prevails as an epidemic, although I have met with several examples where one or two cases only have occurred in the same house or district. The patient in the milder form is affected with slight fever, chills, sickness, and general malaise, for two or three days, when soreness of throat, often slight, is complained of; the glands of the neck are more or less swollen; and on looking into the mouth the fauces and tonsils are seen red, the latter enlarged, with a whitish patch on one or both of them. The adventitious membrane may extend to the palate, fauces, larynx, and air tubes; when the membrane is detached, the parts below are left red and swollen. Sometimes ulceration takes place, the fever as in the onset of croup is not generally high, and the pulse and other symptoms indicate an affection of an asthenic character. The symptoms vary considerably in severity in different cases; there is often great bodily depression, and feeble pulse, not explained by the local affection; the throat symptoms may be slight, and yet the constitutional disturbance very great. The urine is generally albuminous, the albumen often amounting to a fourth or more.

The voice and cough have frequently a hoarse sound, and when the disease extends into the air-tubes a shrill croupal noise, with sibilous breathing, is heard as in genuine croup. In two instances I have seen an eruption like scarlatina on the skin, although the patients had both had this disease, and the state of the throat and other signs did not warrant the belief that it was a second attack. In the latter stage of the disease, and in the more malignant form, purpural spots may occur on the skin, and bleeding may occur from the nose and other parts. In some examples the nares are lined with the false membrane, and in others the gums are specially affected; the eye, the vulva, and anus may take on the diphtheritic action; wounds and abrasions of the skin, from leeches, blisters, and other causes, are covered with the diphtheritic membrane: *lesions, I believe, never seen in genuine croup.*

The symptoms vary much in different cases, and in different

epidemics. Sometimes bronchial and croupal diphtheria prevail to a greater extent, at others the hæmorrhagic and petecchial form may be more prevalent: in some instances, there is little or no cough; and the bronchial complication in many, is entirely absent.

Large pieces of false membrane are often ejected from the throat, larynx, and trachea; fœtid discharge may take place from the nostrils, the tonsils and other parts may be sloughy, and paralysis may occur in the organs of deglutition and in other parts.

PATHOLOGY.

Unlike croup, this disease generally begins above the glottis, the false membrane is more adherent, and extends to the submucous tissue, sometimes into the substance of the tonsils, and even into the glands and muscles of the neck. Under the microscope, as will be seen in Plate VI, the adventitious product differs little from that of croup, except that it contains more epithelial cells. This membrane, as in genuine croup, in many cases extends to the large air-tube and bronchi; in the latter situation it assumes a more pultaceous character. As stated above, the nares, gums, and even the œsophagus may be affected. The abdominal organs most implicated are the spleen and kidneys; the former is large, dark, and often pulpy; in the latter the hæmorrhage may take place into the tubes, and fibrinous casts may be formed. The heart sometimes contains fibrinous coagula, but in other respects is unaffected. The condition of the brain, as far as I know, has not been well investigated.

TABLE OF CASES OF DIPHTHERIA.

I subjoin the following abstract which I have made of all the cases of diphtheria related, and morbid specimens exhibited, before the Pathological Society of London, by way of contrast with the table of croup. I select these because the morbid appearances are well described, but it must be recollected that the croupal diphtheria is more generally fatal, and that in the vast majority of cases of diphtheria in this country, no croupal complication is present. The Society was established in 1846, and it was not until 1858 that specimens of this disease were exhibited.

Table of Cases of Diphtheria.

AUTHORITY.	Sex.	Age.	Duration.	SYMPTOMS AND PATHOLOGY.
Mr. Roberts vol. IX, p. 52 1858.	M.	3	..	Expectorated large piece of false membrane moulded in the bifurcation of the trachea; sore throat; modified croup; no p. m. examination.
Dr. Fuller p. 206	F.	11	..	Cast of pharynx ejected four inches in length when struggling for breath; recovery.
Dr. O. Ward p. 217	children.	..	..	Six cases in the same house, two fatal; no disease of trachea or œsophagus, no difficulty of swallowing; fatal cases, throat much swollen and ulcerated. In one case, purpura.
Dr. Barker vol. X, p. 140	M.	14	..	Grey patches; fauces red; tracheotomy, thick membrane on fauces sent processes into tonsils; larynx, trachea, and bronchi, lined with false membrane.
Dr. Sanderson p. 140	M.	$2\frac{1}{2}$	..	Pharyngeal cavity lined with white false membrane, consisting exclusively of fibrine; hoarseness, fœtid discharge from nares; death.
Dr. Semple p. 314	M.	7	13 ds.	Ten fatal cases in same district within a month (Bagshot, Surrey). Exudation left tonsil and posterior part of pharynx; voice weaker and somewhat more shrill; spots of purpura; died apparently from exhaustion. Tonsils nearly black with scattered white patches, pharynx and larynx intensely reddened. In larynx, close to rima glottidis, some limited false membrane. The trachea contained no distinct false membrane.
p. 313	F.	15	..	Two children had died in the same family; symptoms insidious, tonsils swollen and covered with pellicular exudation; rapidly sunk and died, apparently from syncope. Tonsils, epiglottis, larynx, and trachea covered with false membrane which could only be detached in small strips.
Dr. Peacock vol. XI, p. 311	M.	6	12 ds.	No active febrile symptoms nor marked laryngeal obstruction; two children and a lady who had been in the house also died of diphtheria.

Table of Cases of Diphtheria, Continued.

AUTHORITY.	Sex.	Age.	Duration.	SYMPTOMS AND PATHOLOGY.
Dr. Harley p. 315	F.	28	..	False membrane in fauces and pharynx; four dogs and a snake inoculated, no effect.
Mr. Simon p. 318	M.	19	19 ds.	Eighth day, large mass of thick fibrinous membrane expelled; no cough, respiration natural, urine albuminous; death. Sloughy ulcer on left tonsil, also small ulcer in pharynx.
Dr. Murchison p. 321	F.	12	..	White deposit on tonsils, voice husky; then loss of voice, with croupy cough. Fifth day, large cast of trachea and bronchi expelled; died suffocated; no p. m. examination.
Dr. Bristowe p. 326	M.	10	about 5 dys.	Throat swollen, pultaceous material on tonsils, feeble, nose bled; palate, uvula, tonsils, fauces, œsophagus, and larynx, intensly congested and covered with tough, adherent, and ashy, false membrane.
p. 331	F.	22	about 8 dys.	Acute lung disease, then diphtheria; pharynx, fauces, base of tongue covered with layers of lymph, also epiglottis and larynx.
p. 333	M.	35	17 ds.	Surface of pharynx covered with a loosely adherent white doughy material; this extended to the upper part of larynx. The membrane composed almost entirely of epithelium.
Dr. Hare vol. XIII, p. 259	child	6	6 dys.	False membrane, lined pharynx, nares, larynx, trachea, and bronchi. In the trachea a perfect cylinder, more pultaceous in the bronchial tubes. Tracheotomy; death in twenty-four hours.
Dr. Davis vol. XIV, p. 55	F.	10	..	Sore throat, diphtheritic patch on each tonsil, slight fever, croupy noise on inspiration. Tracheotomy; death in six hours; diphtheritic patches above the vocal cords, back part of tongue swollen and inflamed.

Table of Cases of Diphtheria, Continued.

AUTHORITY.	Sex.	Age.	Duration.	SYMPTOMS AND PATHOLOGY.
Dr. Gibb p. 23	M.	33	..	Contracted from three of his children; fauces lined with thick yellowish-white leathery membrane, a piece of which became detached and produced impending suffocation. Paralysis of the larynx.
Dr. Semple p. 61	child	3	..	Cough and symptoms of suffocation, a tubular membrane occupied the trachea, also the surface of the larynx; trachea and larynx only examined.
Dr. Greenhow vol. XVI	M.	15	12 ds.	Sore throat six days, exudation on left tonsil, urine albuminous, epistaxis, tissues around the tonsils infiltrated and brawny, sloughy in the centres, epiglottis œdematous, patch of false membrane on the under surface, pulmonary apoplexy size of hen's egg.
Dr. Hare p. 18.	M.	24	..	Exudation on tonsil and fauces, bronchi full of exudation matter to their smallest ramifications. Larynx and trachea not named.

STATISTICS OF DIPHTHERIA IN ENGLAND AND WALES IN RELATION TO CROUP.

I now make a careful examination of the Supplement to the Registrar General's Reports from 1851 to 1861, calculating the number of deaths in proportion to the population, in the 623 unions of England and Wales. As my object is especially to ascertain if soil and locality have any special influence in the production of the disease, I shall select from the list such places as afford the greatest contrast as to the ratio of deaths, nature of geological formation, altitude, amount of rain-fall, contiguity to the sea, &c.

In the accompanying map* I have marked the number of deaths from diphtheria in various places in the ten years 1851-1861; the

* This map is not appended, as the reader can readily refer to the geological map before named.

amount of population can be easily ascertained on referring to the third column in the table.

According to the Registrar General's Report, 1871, for the year 1869, the deaths from diphtheria and cynanche maligna from 1855 to 1869 amounted to 61,491; of these, 6926 are described as cynanche maligna, but probably nearly all of them were examples of diphtheria, a disease unknown to many who recorded the deaths. Taking the fifteen years beginning with 1855, when diphtheria was first registered, they stand thus: 385, 603, 1583, 6606, 10184, 5212, 4517, 4903, 6507, 5464, 4145, 3000, 2763, 3012, 2606.

Of these deaths, I find that 33,310 were under five years of age; 3488, between fifteen and twenty-five; and the rest above this last named age.

SUMMARY OF THE ELEVEN DIVISIONS OF ENGLAND AND WALES, 1851-61. SUPPLEMENT, REGISTRAR GENERAL'S REPORT, 1864.

I find that, from 1851 to 1861, the deaths from diphtheria in these ten years were: males, 9844; females, 10,879; total, 20,723. 10,870 of these were under 5 years of age, 2132 were 13 years of age and over, and 140 were between 65 and 85; but, as shown hereafter, the ages of those attacked bear no proportion to the fatal cases, as adults more frequently recover.

DIVISION.	No. of deaths in ten years.	Amount of Population at this period.	DIVISION.	No. of deaths in ten years.	Amount of Population at this period.
London	2023	2583112	North Midland Counties	2613	1251734
South Eastern Counties	2604	1738024	North Western Counties	1654	2713183
South Midland Counties	962	1264914	Yorkshire	2517	1902292
Eastern Counties ..	1557	1128281	Northern Counties..	990	1060749
South Western Counties	1794	1819503	Monmouthshire and Wales	1255	1250874
West Midland Counties	2754	2284745			

It will be seen from the above, that the disease during these ten years, taking the population into account, was more prevalent in the north midland counties, south-eastern, eastern, Yorkshire, west midland, and Wales; least prevalent in the north-western counties, south midland, and in London. But probably during the next decennial period, the result will be very different.

DEATHS FROM DIPHTHERIA IN METROPOLITAN DISTRICTS, 1851-61.

UNIONS.	No. of cases in ten years.	Population.	UNIONS.	No. of cases in ten years.	Population.
Kensington	149	152977	West London	16	27968
Chelsea	30	59989	London, City	20	50740
St. George's, Hanover square	88	80501	Shoreditch	93	119310
Westminster	47	66910	Bethnall Green	39	97647
St. Martin's-in-the-Fields	11	23665	Whitechapel	30	79364
St. James's, Westminster	13	35866	St. George's East	40	48634
Marylebone	115	159688	Stepney & Mile-End Old Town	68	110206
Hampstead	14	15446	Poplar	45	63189
St. Pancras	170	175872	St. Saviour's	14	35950
Islington	149	125335	St. Olave's	15	19216
Hackney	66	70862	Bermondsey	42	53241
St. Giles's	36	54145	St. George's, S.	35	53667
Strand	19	43720	Newington	89	73518
Holborn	41	45741	Lambeth	147	150684
Clerkenwell	41	65229	Wandsworth	60	59604
St. Luke's	11	55565	Camberwell	53	63077
East London	15	42546	Rotherhithe	7	21155
			Greenwich	86	113518
			Lewisham	49	50296

On glancing at the above figures it will be seen that the number of deaths from diphtheria in these districts does not bear the same amount of irregularity as those in the provinces. Chelsea, which is lower than Kensington, has proportionately nearly half the number of deaths. St. Martin's-in-the-Fields, St. James's Westminster, the Strand, East London, London City, Whitechapel, St. Saviour's Southwark, and Rotherhithe, have the smallest number in proportion to the population; the last named place, one of the most likely localities for diphtheria, if modern writers are to be credited, least of all. So that, looking to soil, height above high water mark, and density of population, the inference is, that, as regards London, these causes have little to do with the production of the disease.

The following are the selected unions in England and Wales, showing deaths from diphtheria in ten years, 1851 to 1861, with the amount of population. Examples are taken from the Registrar General's eleven divisions as they come in succession. 1. London (already quoted). 2. South Eastern. 3. South Midland. 4. Eastern. 5. South Western. 6. West Midland. 7. North Midland. 8. North Western. 9. Yorkshire. 10. Northern. 11. Wales (including Monmouthshire). On referring to the map it will be seen that I have noted the geological formation, with the number of deaths in each union.

DEATHS FROM DIPHTHERIA IN THE PROVINCES, 1851-61.

UNIONS.	No. of cases in ten years.	Population.	UNIONS.	No. of cases in ten years.	Population.
Guildford	45	27100	Shrewsbury	11	24444
Reigate	60	17219	Ellesmere	54	14926
Gravesend	8	17707	Stoke-upon-Trent	71	64625
Medway	23	47300	Leek	73	23918
Tunbridge	101	31408	Tamworth	38	14715
East Ashford	50	12123	Wolverhampton	114	115530
Bridge	41	11240	West Bromwich	76	81104
Sheppey	6	15940	Dudley	118	118399
Thanet	17	31831	Upton-on-Severn	48	19540
Eastry	79	25531	Birmingham	148	193286
Dover	72	29950	Aston	144	83687
Hastings	19	23924	Nuneaton	1	13293
Battle	84	13456	Ashby-de-la-Zouch	64	27187
Uckfield	62	17446	Boston	107	38206
Lewes	83	26358	Sleaford	85	24736
Worthing	44	18833	Grantham	74	29367
Midhurst	54	12090	Lincoln	132	44563
Havant	2	7211	Horncastle	174	24820
Portsea Island	47	83477	Spilsby	114	28869
Alresford	0	7351	Louth	117	34068
Hemel Hampstead	1	14521	Caistor	152	36904
Buckingham	3	14078	Glanford Brigg	69	34259
Oxford	1	20105	Gainsborough	170	26616
Chippingham Norton	1	17368	East Retford	75	22717
Banbury	43	29960	Newark	81	30267
Thrapston	2	13453	Chesterfield	202	53787
Luton	4	27899	Nantwich	95	38448
Chelmsford	66	32318	Liverpool	124	263989
Rochford	45	17050	West Derby	164	189562
Maldon	100	22347	Manchester	97	236210
Bury St. Edmunds	2	13609	Haslingden	118	60002
Blything	42	27365	Blackburn	69	105340
Tunstead	144	15065	Garstang	0	12566
Errpingham	137	28297	Ripon	1	15892
Aylsham	108	19582	Sheffield	244	116288
Wayland	2	11851	Rotherham	104	38716
Mitford	54	28705	Thorne	81	15949
Chippenham	54	21718	York	106	57146
Devizes	2	21958	Howden	118	14719
Bradford	3	11040	Belford	2	6565
Mere	31	8245	Berwick-on-Tweed	2	22977
Wimborne	53	17268	Alston	2	6610
Launceston	53	17655	Chepstow	79	18500
Bodmin	49	20093	Llanelly	2	25742
Scilly Isles	0	2529	Narberth	90	21737
Bristol	48	65872	Haverford West	96	38363
Clifton	61	86318	Dolgelly	1	12727
Hereford	59	37221	Anglesea	2	38945
Bridgenorth	36	15764			

It will be seen from the above statistics at page 142, that, whilst true croup maintains a steady ratio as to the annual mortality, diphtheria, as might be expected from an epidemic disease, varies considerably; the mortality in 1859 being nearly four times that of 1869. Such a fluctuation does not occur in genuine croup. There is another important difference, moreover, that although diphtheria, like croup, more frequently attacks the young, yet the examples of the occurrence of the disease after puberty are far from unfrequent. Another important difference may be noted, viz., that whilst diphtheria is more frequent in females, the majority of cases of croup occur in the male sex.

My friend, Dr. Bolton, of Horncastle, Lincolnshire, where in 1858 diphtheria was more prevalent than in any other part of England, has furnished me with the records of the Dispensary to which he was attached, and at which accurate records were kept. From July 1858 to May 1859, 567 cases of diphtheria were treated; of these only thirteen died. The cases were more numerous in November, December, and January. The duration of the disease varied from twelve to twenty-one days. I select from the dispensary book the ages of those of fifteen years and upwards.

17, 42, 34, 15, 16, 16, 16, 16, 16, 29, 34, 16, 44, 22, 21, 30, 40, 15, 40, 20, 15, 40, 15, 16, 52, 17, 19, 52, 42, 46, 20, 19, 40, 19, 25, 16, 44, 16, 16, 55, 17, 45, 60, 23, 17, 53, 19, 19, 35, 26, 32, 45, 21, 18, 15, 15, 45, 35, 34, 17, 29, 44, 40, 17, 19, 41, 15, 16, 29, 50, 20, 30, 40, 19, 16, 24, 22, 16, 16, 55, 22, 24, 15, 24, 18, 19, 19, 18, 58, 45, 35, 25, 30, 16, 20, 27, 30, 17, 15, 47, 18, 28, 45, 15, 42, 34, 44, 18, 15, 30, 19, 18, 24, 24, 22, 57, 55, 18, 31, 21, 17, 16, 17, 27, 21, 32, 22, 26, 17, 16, 19, 48, 16, 37, 16, 62, 30, 17, 32, 25, 18, 28, 40, 23, 15, 16, 16, 20, 15, 16, 56, 19, 36, 26, 45, 25, 18, 15, 19, 21, 30, 40, 52, 17, 25, 32, 15, 24, 17, 49, 25, 57, 16, 16, 20, 31, 18, 22, 16, 17, 17, 39, 34, 15, 23, 16, 17, 20, 22, 17, 20, 44.

Of these 567 diphtheritic cases, 195, as shown above, were fifteen years of age and over. 336 of these 567 patients, I find were females. The ages of the fatal cases were 13, 15, 16 months, and $2\frac{1}{2}$, 3, 4, 4, 5, 5, 5, 6, 9, and 18 years.

What practical lessons does this analysis teach us? It shows, firstly, the importance of the registration of disease, as well as of death, and secondly that a great many more adults are attacked with diphtheria than are indicated by the deaths.

When this disease is compared with that of croup, it has, looking

to age, recovery, duration, seat, laryngeal, tracheal, and bronchial lesions, and epidemic character, scarcely one feature in common.

The mode of treatment is given in every case. The external applications to the throat were croton, iodine, nitrate of silver, chlorate of soda and cantharides, borate of soda and chlorate of potash; gargles were often used. The internal medicines were chlorate of potash, perchloride of iron, and quinine. The first named was generally given, the second often administered, the quinine much less frequently. I quote the mode of treatment by way of comparison with that of croup, and for the purpose of showing that, looking to the small number of deaths, it was very successful.

I select from Dr. Bolton's communication to me some interesting particulars.

The first tocsin of this disease reached us from Essex. From the marshes of Essex to the Welham level of Lincolnshire is almost a dead flat; Huntingdonshire and Cambridgeshire, bog-soil and flat; Lincolnshire, the rush soil of the old Fens, now dry, and intersected by canal-like drains.

Draw a straight line from Essex to the line of the Welham, allowing a greater or less area in width on either side, and you have the steadily progressive march of this epidemic, precisely like that of the cholera in India, in 1817, as described to me by old Indian officers; sometimes skipping a village, now and then returning to it; now capriciously keeping to one side or the other of a street, in part of a house, now leaving altogether, there being no new victim after a certain day.

On leaving Boston, the epidemic divided its line of march, being cut in two by the Spur of the South Wolds: on the one side, clinging to the Witham, up to Lincoln; on the other, taking nearly the route of the East Lincolnshire Railway, to beyond Eurish, when it suddenly overtopped the South Wolds at their highest elevation, about Caistor, where, both in the Chalk and Ironstone district, it fell with awful fatality, sweeping whole families of children.

The Dispensary Register ends with the period when the disease ceased to be very formidable; the cases turned up frequently, more especially on the borders of the Fens, for years afterwards. "Throughout the whole period the fatality was much greater in *private* than in *dispensary* practice; mainly, I believe, to this cause: in the latter the cases were easier and more constantly seen, on the varying symptoms of this fell malady." As regards local treatment, Dr. Bolton says, "I do not agree with the application of

solid caustic, for I am sure it often aggravates the local condition of the throat, and sometimes causes death."

From questions I have put to this gentleman in writing, I learn the following facts; some of the answers, especially the first, are of great practical value.

(1) A gentleman, who had not seen diphtheria, mistook it for epidemic croup, treated his patients with calomel, and hence the thirteen deaths. After chlorate of potash was used with dilute hydrochloric acid, no death occurred.

(2) Those exposed to the air did better than those in damp cottages, and the greater fatality among the better classes has been named above.

(3) In one gentleman the disease was traced from day to day, from pharynx to bronchial tubes, when he died asphyxiated. There was no cough, nor stridulous breathing.

(4) One strong lad brought up several perfectly shaped cylinders of the pharynx and gullet: he ultimately recovered.

(5) The voice always low when the throat was coated with false membrane, but never stridulous nor clangous.

(6) The disease was not supposed to be contagious.

(7) Never seen delirium in any case of diphtheria.

(8) In about five per cent. the disease extended to the air passages.

(9) Cough seldom present.

(10) Three examples of blistered surfaces taking on diphtheritic action; also the vulva.

(11) Paralysis, partial or interrupted, was not an unfrequent consequence.

(12) The only cases that resembled true croup were those from rough interference.

(13) Soil or locality apparently had no influence, the village that suffered most was on high dry ground.

(14) As regards treatment, the solid nitrate of silver was positively hurtful. Croton oil dissolved in alcohol the best. Stimulants did not exert the same effect as in low fever. Quinine and perchloride of iron laid aside as useless, and chlorate of potash used in their stead.

(15) Tracheotomy performed in one case; the wound took on diphtheritic action, and the child died.

As I have said before, the symptoms vary in severity in different epidemics, but the above evidence, never before published, from a gentleman of great practical experience, is valuable. I could quote

largely from published documents respecting other epidemics of diphtheria in this country.

Mr. T. Stiles, of Pinchbeck, has given an excellent account of an epidemic that prevailed at that place in 1838 (*British Medical Journal*, 1858, p. 629). "Out of a population of 3000 inhabitants, in six weeks, 350 were attacked, and 9 died. The disease was attended with symptoms of great prostration."

Dr. B. Sanderson reports (*Medical Times and Gazette*, 1859, p. 457) on an epidemic at Hertingfordbury on the River Lea. Out of 750 attacked, 14 died, and these were under twelve years of age. One autopsy only was performed, and in this case there was no false membrane in the larynx.

CAUSES OF DIPHTHERIA.

It is difficult to assign any satisfactory cause for the progress of this disease. It occurs in nearly all climates and soils, irrespective of temperature, altitude, rain-fall, miasma, cleanliness, drainage, and the causes that appear to influence the spread of other epidemics. Like cholera it was very capricious in its selections, affecting sometimes the inhabitants on one side of a street or river, and not the other. Many of our dirtiest and most unhealthy towns and cities were comparatively free from it; whilst large communities of people escaped its ravages; small places with few inhabitants were stricken by it; isolated cases, of which I have known many, often occur; and yet the evidence as to its contagious nature is indisputable. When it raged with the greatest violence in this country in 1858 and 1859, many thought that its progress could be traced from place to place, but these mappings and tracings were soon discovered to be erroneous. The map which I have attached will afford the reader a better idea of its more fatal localities, than any description I can give. I have selected the unions in the table for the purpose of showing the localities in which the disease in these ten years was most fatal, and others where its victims were comparatively few. I have not had time to add the geological formation, but if the reader will turn to Pravenstein's Geological Map of England and Wales he will see that the nature of the soil had little to do with the origin of the disease. Many die apparently from exhaustion, from poisoned blood and uræmia, which play an important part probably in hastening the fatal termination.

TREATMENT OF DIPHTHERIA.

I only enter into this question in connection with that of croup, for the purpose of showing the non-identity of the two diseases, and that a treatment applicable to the one, will not generally apply to the other. The cases alluded to at page 165, speak volumes. On consulting, as I have done, the records of the experience of numerous practitioners who have treated diphtheria, both in its epidemic, and its isolated form, I was at first inclined to think that the whole was a kind of hap-hazard, hit or miss system, without aim or object, but it must be recollected that the disease is new to British practitioners, and that means, which appear at first sight to be very opposite, produce the same result. Thus, whether nitrate of silver, tincture of perchloride of iron, or mineral acids be applied to the throat, the effect may be nearly the same, all have their respective advocates; and so when we look to internal medicines, such as chlorate of potash, perchloride of iron and quinine, or ammonia.

Let me merely enumerate some of the chief means that have been used in the treatment of this disease; and, first, of applications to the throat. Hot applications externally, ice externally and internally, vapours of various kinds, some in the form of spray, the nitrate of silver in the liquid or solid form, croton oil, tincture of perchloride of iron, the mineral acids, calomel and sulphur insufflations, sulphur gargles, carbolic acid, Beaufoy's fluid, borax, tannin, sulphate of copper, alum, cantharides. For the dissolution of the membrane, bromine, lime water, lactic acid, lactate of lime, and caustic potash have been employed.

Among the internal medicines, emetics, chlorate of potash, perchloride of iron, quinine, ammonia, bromide and iodide of potassium; sulphur, tartar emetic, permanganate of potash, cubebs, glycerine and lime water, bicarbonate of potash and soda, sulphate of potash, &c.

I have never seen diphtheria in an epidemic form, but I have treated several isolated cases with tincture of perchloride of iron and nitrate of silver to the throat, and I give the preference greatly to the former. As regards internal medicines, there is no specific for this disease, nor one medicine that is applicable in all cases. Diphtheria, as I have said before, differs much in the severity of the symptoms, which have varied greatly in different epidemics. Most practitioners are agreed that the supporting plan is the best, and that the antiphlogistic treatment, so generally used in croup, will not answer in diphtheria.

I will conclude this chapter by the relation of a case that fully shows the lethal action of the diphtheritic poison.

August 27th, 1870.—I was called to see a lady, seventy years of age, who had generally enjoyed good health, she was stout, a very free liver, and took a large amount of alcohol. The *arcus senilis* was well marked. After being in her *usual* health two or three days before I saw her, she felt a little indisposed, vomiting, cough, stiffness about the neck, and soreness of throat, the pulse was not much altered. On looking into her throat I found the tonsils red and swollen, and on each was a diphtheritic white patch about the size of a shilling; the uvula likewise had a slight patch of adventitious membrane. The throat externally was also swollen, I painted the throat patches with the perchloride of iron, and in a few days the throat symptoms subsided, but although I gave her plenty of support, with ammonia and quinine, she never regained strength; the urine became slightly albuminous, the lower extremities lost their power, she was drowsy and the intellect a little muddled, but she retained her faculties nearly to the last, when she died comatose, probably from uræmia, on the 29th of September, about five weeks from the commencement of the attack. No post-mortem examination was allowed.

TRACHEOTOMY.

When all other means have failed, and often before the patient is *in extremis*, this operation is now resorted to by many surgeons, especially on the continent. I have reason to believe that it has been performed when laryngeal catarrh, or diphtheria, was mistaken for true croup; but, taking into account the great number of successful cases now recorded, it is one that must demand the serious attention of all physicians and surgeons.

Trousseau, whose enthusiasm on this subject is well known, said, "*Ne pas faire la trachéotomie c'est un act coupable.*" As is well known, the nephew of the first Napoleon, the son of Queen Hortense, died of croup; and Napoleon offered in 1812 a prize of 12,000 francs for the best essay on this disease: which prize was divided between Jurine of Geneva, and Albers of Brennan; both of whom were opposed to tracheotomy in croup. But let me look to the origin and progress of this operation; such a retrospect cannot fail, if fairly conducted, to lead to practical results.

It is a curious circumstance, that, although the operation for croup was first recommended by an Englishman, it has not in this

country been so well thought of, nor so frequently performed, as on the European continent; and the same remark will apply to America. I quote the observation of Home upon this subject, 1765 (in his work before cited, p. 59). "We have then," he says, "no method of saving the patient's life but that of extraction. That cannot be done through the glottis. When the case is desperate may we not try bronchotomy? I can see no weighty objection to that operation, as the membrane can be so easily got at, and is very loose. Many a more hazardous operation is daily performed. I would propose, however, that it should be first tried on a dead subject, that we may proceed with all manner of caution and assistance. But something ought to be tried in this dangerous situation."

Cheyne, who wrote sixteen years later, objected to the operation, because he found the bronchi filled with a puriform fluid, which he thought had more to do with the cause of death, than the membrane in the larynx and trachea.

The first operation for croup was performed by Mr. Andree, a London surgeon; the case is copied from an inaugural dissertation of Dr. Thomas White, 1786, and related by Dr. Farr (*Medico-Chirurgical Transactions*, vol. III, 1812). "A boy, five years of age, for three days had all the symptoms of croup; the respiration was very difficult, and the symptoms not yielding. Mr. Andree opened the trachea in the presence of several of the faculty: the incision, an inch and a half in length, was made through the membrane, between the second and third annular cartilages, then between the fourth and fifth; a silver canula and a bougie, both produced so much irritation that they were withdrawn; large quantities of mucus and pus escaped from the wound, and the child gradually recovered."

In *The Medico-Chirurgical Transactions*, 1815, p. 150, Mr. Thomas Chevalier relates the case of a boy, seven years of age, who first had cold and cough. On the 25th of April symptoms of croup set in; on the 26th he was bled largely, to fainting, from the jugular vein, and an emetic given; false membrane resembling that found in croup was expectorated. On the 27th the case appeared hopeless, but Mr. Chevalier divided two of the first cartilaginous rings vertically, cutting afterward transversely, in the interstice between them. On the 29th the patient brought up with a slight cough a dessert-spoonful of tough mucus; none escaped from the wound. On the 13th of May he was well enough to go into the country.

I have devoted more space to these cases than I should have done, if some continental writers had given these English surgeons the credit they deserve.

There is one practical and important fact connected with these two successful examples of tracheotomy, viz., that in neither instance was a canula nor a tube of any kind used.

To show how little the operation has been practised in this country, and the slight success that has attended it, the late Dr. Tanner, in his work on *The Practice of Medicine*, 1870, states, "that it has only been successful in England, for croup, in about eleven cases."

This estimate is far under the mark; but when compared with the success met with by many foreign surgeons, it is relatively slight in this country. Many, I believe, have been deterred from a repetition of the operation, in croup, in consequence of their failure; but it should be recollected that several of the continental surgeons were at first unsuccessful. Guersant lost his first twenty-three patients. M. Henriette, surgeon to the Hôpital St. Piérre, Brussels, was prejudiced against the operation, from want of success in his first cases; but he has since saved four children out of eight. (*Presse Méd. Belge*, 1860, No. 34.)

My own experience in this operation is so limited, that it is scarcely worth quoting. I have operated five times, and all were cases of genuine croup; four of the patients were examined after death, and in all the adventitious deposit extended into the smaller air tubes, where it assumed a more pulpy pus-like character. The children were all under four years of age, and the operation was never performed until all chances of recovery were supposed to be hopeless. Three of the children were *in extremis*; and the incision in these cases was made between the thyroid and cricoid cartilages. In two instances the operation seemed to afford instant relief, and the symptoms improved; but the canula, in consequence of the want of proper assistance, got plugged, and the patients were suffocated; a single canula was used in one, a piece of elastic bougie in the other. This want of success would not deter me from repeating the operation; but I would do it earlier, use a double canula, and if possible have a proper assistant at the bedside for three or four days.

But let me first glance at the success attending the operation on the European and American continents, and then briefly review that in our own country.

According to Dr. H. Carl Gerhardt, 1851, Guersant lost his first 23 patients after tracheotomy for croup. Of Trousseau's 146 operations, 25 per cent. were saved. Gerdy saved 4 patients out of 6. Of 460 children operated upon at the Paris Hospitals, 126 recovered. At the Hôpital St. Eugénie 17 out of 91. Guersant in his private practice saved 10 in 82. Trousseau, 1850 to 1855, 20 in 42. Archembault, 6 in 12. Spence, 3 out of 5.

In a very able paper on Tracheotomy in Croup, by Dr. A. L. Voss in *The New York Journal of Medicine*, p. 30, 1860, a *resumé* is given of the success attending this operation in the hands of various surgeons; he quotes some of the figures given above by Gerhardt. In addition, Bhuchut 131 operations, 49 successful. In New York, 10 in 24. Of 444 operations at the Paris Hospitals, 1850 to 1858, he says, 100 were cured, the successful cases being from one-third to one-fourth.

Dr. Voss relates 15 cases in which he performed the operation, and 5 of them were successful. It is questionable, I think, after a careful perusal of the cases, whether many of these were examples of genuine croup.

In Germany, out of 308 operations, it is said that there were 103 recoveries. Dr. P. Güterbock, of Berlin, (*Archiv. der Heilk*, VIII, 6, 1867,) states: "In a given number of cases under two years, 9 recovered; between two and seven, 21 (37 per cent.); over seven, only 2 out of 14." M. Lamre, Holland, (*Medical Times and Gazette*, 1857, p. 197,) saved 1 out of 2 patients operated upon.

If I searched the foreign journals I could find a much larger number of successful cases, but the above will suffice to show that the operation is on the Continent attended with greater success.

Let me now look to the operations recorded in this country; many successful cases probably have not been published.

Mr. H. Smith, surgeon to King's College Hospital, has been one of the most zealous in the performance of tracheotomy in croup; although, judging from his reported cases, (*Medical Times and Gazette*, vol. I, p. 244, 1853, and 1856, p. 153,) his efforts have at present not been very successful; but his patients were nearly all in an unpromising condition. The reporter of *The Medical Times and Gazette*, 1859, p. 219, mentioned one successful case in diphtheria. In the same journal, 1857, p. 431, Mr. Jones of Jersey, out of 4 operations, cured 2 children. At St. George's Hospital, 3 recoveries out of 6 occurred, and at the King's College Hospital, 1.

At the Dreadnought Hospital Ship, 8 were operated upon, and

all died. (*Medical Times and Gazette*, 1859.) It should be remembered that some of the successful cases at hospitals are alluded to in the above summary more than once. Mr. Eales (*Lancet*, 1836) reports a successful case, and Dr. Wilks, at Guy's Hospital (1867, p. 539). Mr. I. Savage, *British Association Journal*, 1871, p. 391 ; and if time permitted I could probably add to the list.

The best arranged and most successful cases reported in this country, are those related by Dr. G. Buchanan, of Glasgow. Out of 26 cases, he had 13 recoveries. Of these children, I find the majority were affected with diphtheria.

An interesting question has been raised, as to the propriety of operating at an early age ; one gentleman (*Association Journal*, 1871, p. 278) laid it down as a surgical law, "that no child should be operated upon for croup before the age of four years." Trousseau, before cited, (vol. II, p. 616,) entered fully into this question, and quotes four successful examples at an early age. The following numbers indicate *months* : Trousseau, 13 months ; Bell, Edinburgh, 7 ; Maslurat, 23 ; Barthez, 13. Dr. Sanders, in the same journal, (p. 337,) has adduced other instances: Barzeau, 10 and 15 ; Isambert, 16 ; Roger, 19 ; Vigla, 17 ; Islani, 18 ; and, in consequence of this discussion, other cases "cropped up" in this country. Cooper Foster, 11 ; Lauson Tait, 7 ; Meigs and Pepper have also recorded successful cases at an early age.

I have said enough, I think, to show that the successful cases in this country are sufficient to warrant the earlier performance of this operation, in many instances. The mode of operating I need not enter into ; this will be found in all recent surgical works.

CONCLUSIONS.

From my own experience, and from information obtained from different sources, I draw the following conclusions, which relate chiefly to croup and diphtheria, as seen in this country.

That although croup, judging from the Registrar General's Reports, is nearly, or quite, as prevalent as in former years, I believe that the type of the disease is somewhat modified, and that it is often of a less sthenic and acute character than formerly.

That croup and diphtheria, as seen in this country, are separate

and distinct diseases, and although in some instances the line of demarcation is slight and ill defined, in the great majority of examples the distinction is evident and well marked.

That the one, genuine croup, is a local disease, affecting chiefly the larger air tube, and often its smaller branches; the other, diphtheria, is an affection commencing for the most part above the larynx and trachea, in the tonsils, fauces, and pharynx, and descending often to the large air tube and bronchi.

That the occurrence of croupal symptoms in many cases of diphtheria, from the extension of the diphtheritic membrane from the fauces into the air passages, is no evidence of the identity of these diseases.

That since the recent occurrence of diphtheria in this country, it is more than probable that some cases of croup have been registered under that head.

That whilst croup is a local non-contagious affection, diphtheria is a blood disease that infects the whole system, and is of a highly contagious nature.

That it is questionable whether true croup should be placed among zymotic diseases, strictly so called.

That whilst the invasion of croup is often sudden and unexpected, that of diphtheria, like most zymotic diseases, has generally a certain period of incubation.

That whilst genuine croup, in this country, is more frequent in the male sex, the majority of cases of diphtheria occur among females.

That, although both diseases are more prevalent in young children, genuine croup rarely or ever occurs after the age of puberty, whilst in diphtheria a large number of examples are found after that period, as shown by the statistics I have quoted.

That the age of those dying of diphtheria is no sufficient criterion of the number of those attacked, because the disease is far more fatal in infants and children.

That in many epidemics of diphtheria in this country more than one-third of the patients have been over fifteen years of age.

That from the same statistics it is also shown, that whilst, in this country, the number of cases of croup each year is tolerably uniform, that of diphtheria presents great irregularity; and if diseases were registered as well as deaths, this disproportion would be far more apparent.

That diphtheritic epidemics, like those which occurred at Tunbridge, Eastry, Maldon, Aylesham, Horncastle, Haslingden, and

many other places in this country, have never been observed in true croup.

That further evidence is required (as shown by the map appended) to support the general belief, that croup and diphtheria are, in this country, more prevalent in low marshy districts.

That the nasal, gingival, œsophageal, ophthalmic, aural, cardiac, vaginal, and preputial complications, met with sometimes in diphtheria, are never present in true croup.

That, in a vast number of cases of diphtheria, no cough nor hoarseness of voice is present, but that, in croup, these symptoms are rarely or ever absent.

That although albuminuria is a very general symptom in diphtheritic patients, it has but rarely been found in croup, although it should be observed, that this is a matter yet requiring elucidation.

That whilst in croup the adventitious deposit is *upon* the mucous membrane, in diphtheria it affects the submucous tissue, and often extends into the glands and muscles.

That in diphtheria, both the spleen and kidneys are generally in an abnormal state, whilst in croup we have no proof that these organs are in any way diseased.

That whilst in diphtheria, wounds from leech bites, blisters, and other causes, may take on a diphtheritic action, in croup such occurrences have never been observed.

That whilst croup seldom lasts beyond the sixth day, diphtheria may continue for three or four weeks, and its sequelæ remain for life.

That whilst the mortality from croup, in this country, is generally about one in five or six, that from diphtheria does not often exceed one in fifty, and sometimes even less than this.

That the microscopical appearances of the false membrane, in the two diseases, present but little difference, although, in the diphtheritic exudation in the air passages, there are generally more epithelial scales, and fewer pus globules.

That the fungoid theory, as to the origin of diphtheria, is not based upon sufficient evidence, and that this fungus (*odium albicans*) is the effect, and not the cause, of the disease.

That the condition of the blood in the cavities of the heart and large vessels, especially in croup, has not been sufficiently observed, and demands more careful examination by future investigators.

That the discrepancies that exist between most British and Continental physicians, respecting the nature of croup and diphtheria

probably have arisen from the circumstance that diphtheria in France and in some other countries, has been far more prevalent than in England, and that the admission (before quoted) made by Trousseau goes far to strengthen this inference.

LOWER ANIMALS.

That, both in quadrupeds and birds, a disease somewhat similar to true croup sometimes occurs; but that, in the former especially, it partakes more of the nature of laryngitis; whilst in birds the product has less consistence, and is of a more pultaceous character.

That, judging from the experiments quoted, neither croup nor diphtheria can be conveyed from man to the lower animals.

That although, by the application of certain irritants to the larynx and trachea of the lower animals, a thin adventitious membrane may be the result, (as in some cases of laryngitis in man,) no disease resembling true croup has been produced.

TREATMENT.

That the treatment of these diseases, as influenced by their sthenic or asthenic character, is entirely different; the one requiring the antiphlogistic treatment, the other an opposite course.

That in croup, local internal applications to the throat are of little or no avail, whilst in diphtheria many are apparently of great efficacy.

That, judging from my own experience, when the child is seen early, the antiphlogistic treatment in acute croup, including leeches to the throat, hot fomentations, with an emetic at the onset, small and repeated doses of calomel, with tartarized antimony and ipecacuanha, is the most successful.

That calomel, in this, and some other children's diseases, probably acts beneficially by producing a kind of revulsive action upon the intestinal mucous membrane.

That the efficacy of treatment, in this and most other diseases, depends greatly upon its early application, and I have reason to believe that I have, in several instances, arrested the progress of croup, by an emetic, a warm bath, and a brisk purgative, but in no instance have I succeeded in arresting the progress of diphtheria.

That, judging from the success of tracheotomy, from the recorded cases, both in this country and on the European and American con-

tinents, as shown in the chapter on this subject, it is an operation that after due consideration should be more frequently practised by English surgeons than heretofore.

That the objection urged against its performance in diphtheria, in consequence of the wound taking on a diphtheritic action, should not deter the surgeon from opening the air tube.

That the operation in a great number of instances, especially in this country, (as in my own cases,) has been performed too late, when the large air tube, and its smaller branches, have been obstructed with adventitious deposit.

That, although several successful cases of tracheotomy are recorded, both in croup and diphtheria, in children under two years of age, the operation affords a much greater chance of cure after the age of five years.

That one of the most important matters, as regards the success of the operation, is the constant watching of a proper attendant to adjust the tube, and prevent its stoppage.

That some of these conclusions, as in all others, where statistics are used, may to a certain extent be fallacious, from the uncertain nature of the premises, the early bias of the investigator, and the difficulty of drawing certain and positive inferences from etiological and pathological data.

ADDENDUM.

I have recently, (August 30th, 1872,) when on a visit to my friend, Mr. Adkins, Surgeon, of Ycalmpton, Devon, seen in Brixton churchyard, the grave and monument of nine children, brothers and sisters, who died in the same house, of diphtheria, in about thirty days. Their ages varied from one year to thirteen. Twelve persons in this house were attacked, two of them being adults; these recovered. Two other adults in the house werfree from the disease. No person who visited the invalids took the come plaint. Diphtheria was never seen in the neighbourhood before, and these were the only known cases in the district.

Mr. Adkins, who attended three of the children, says, "the disease was of a most malignant character, the average duration being about three days. The fauces were covered with a stringy, white, diphtheritic membrane, which, on being removed, left an inflamed surface beneath."

The house is seated on a high eminence, but the sanitary conditions, to which Mr. Adkins attributed the occurrence of the disease, were very unfavourable. A large open pond, near to the premises, received all the sewage from the house and other buildings, and in other respects the dwelling, a farm house, was in a very unsatisfactory state. The soil was light, with slate underneath. Mr. Adkins thinks that if these children could have been removed, several of them would have been saved. In no respects did the symptoms of these children resemble those of croup.

TARASP:

ITS MINERAL WATERS AND ITS CLIMATE.

By Leonard W. Sedgwick, M.D.,
Honorary Secretary and Editor of the Transactions of the Association.

PREFATORY.

The sufferings during two previous springs of one very near to me, led me, in the autumn of 1871, to try whether the drinking at its source of a natural alkaline water would not bring to her some immunity against another attack of gallstone colic. The recorded instances of relief, sometimes permanent, sometimes only temporary, from the use of the waters of Carlsbad or Vichy justified a hope, at least, of some benefit from the projected course, if fittingly carried out. England possesses no water of this kind, and we had determined to go to Carlsbad, when in the course of my reading I came upon Dr. Burney Yeo's book, "*Notes of a Season at St. Moritz in the Upper Engadine and of a visit to the Baths of Tarasp*," and after reading his graphic and admirable chapter on the use of the waters of Tarasp, I resolved to go there, for I had no small amount of confidence that there was a greater chance of obtaining the longed-for health by the use of the remedy in a high-lying Alpine valley than in a low-lying town. And so we went to Tarasp, and found there in large measure what we were seeking.

A double sense of duty and of gratitude compelled me to attempt to make, if it may be, yet more widely known the great value, as a health-restorer, of Tarasp, in its waters and in its climate. And that what I purposed might be better worth the doing, I wrote to Dr. Killias, the resident physician, during the season, at Tarasp, told him of my purpose, and asked him of his kindness to give me any later observations and opinions of his than were to be found in his work, "*Der Kurgast in Tarasp-Schuls.*" To my request he has most courteously replied by answering in the fullest manner

my questions; and the information he has afforded me, and my own observations on the the spot, I have now the honour of offering to the consideration of the Members of the Association.

THE JOURNEY.

Situated at the very easternmost frontier of Switzerland, within a few miles of the Austrian Tyrol, the length of the journey to Tarasp is no light matter. The nearest route is by Paris, Basel, and Zurich; and if the traveller wishes, and intends, as I take it all sensible folk do, to spend his nights in bed, he will need four days for his work. Leaving London in the morning he will pass the first night in Paris; the next day he will get to Basel, where he will sleep the second night; the following day he will reach Landquart, where he will stay the third night; and at the end of the fourth day he will make Tarasp. If, on the other hand, he spends the first night in travelling from Paris to Basel, he may get to Tarasp at the end of the third day. Landquart is on the United Swiss Railway, the next station but two to the terminus Chur, the chief town of the canton Graubünden. So far the journey is by rail, and, the last day especially, through a magnificent country, of which the peaceful beauty of Lake Zurich and the rocky grandeur of the north shore of Lake Wallenstadt will be ever-living memories. From here the journey is by diligence, which last year started in the morning before a train from the westward arrived at Landquart, and so perforce the night must be spent there. But in returning from Tarasp, if this route be taken, I would strongly urge the traveller to do as we did, go on by rail a few miles further, to Ragatz, for the night, where at the Hof Ragatz he will find a courteous host, a clean hostelry, and excellent provender.

The diligence from Landquart to Tarasp starts at six o'clock in the morning, and arrives about seven in the evening. For the first few miles the road is flat, and runs through a young pinewood; but soon the Klus Gorge is reached, whose lofty overhanging rock-sides approach so near each other, that, for three quarters of a mile, there is little room for anything else but the road and the river which run through it.

After passing the defile, the road gently ascends through a rich valley, the Prättigau, enclosed by mountains, many of which are snow peaks, and sustaining a large population by its excellent pastures and numerous orchards. Not far from the road are the baths of Fideris, alkaline and chalybeate, with a local reputation

of more than three hundred years for the cure of dyspepsia, consumption, and disorders of menstruation. Further on are the sulphur baths of Serneus; and then Klosters is reached at about half-past eleven in the forenoon, where a good and clean dinner is served.

The ascent has so far been very gradual from Landquart, itself some 1800 feet above the level of the sea, to Klosters, which is 3953 feet high, and a distance of more than thirty miles has been traversed. Here the Prättigau is left by a zigzag road, which climbs a beautiful fir-clad mountain to a height of 5340 feet, and then descends to Davos Dörfli, which has been recently recommended as a cure place for phthisis. The broad undulating plain, surrounded by well-wooded mountains, in which lie the several villages called Davos, and of which Davos am Platz is chief, is in summer a charming peaceful spot, sunny and wind protected, and beautifully green; but in winter neither so charming nor so peaceful, I take it; and, in the absence of clear and definite knowledge about the curative powers of an Alpine climate in phthisis, an unfit place to which an English physician should consign for a rigorous winter a weak and delicately nurtured consumptive. On this point Dr. Burney Yeo has some excellent remarks in his above-mentioned book.

Leaving Davos, the road, a wonderfully good one, continues to ascend through green meadows, and here and there among patches of corn, with fir-clad hills on each side; but soon the corn-patches cease, and then the rich meadows cease, and the white way winds slowly up a rugged, barren, stony valley, between lofty snow-topped mountains; the Fluela Weisshorn on the one hand, the Schwartzhorn and the great Grialetsch Glacier on the other. And so is reached the summit of the Fluela Pass, 7894 feet high. The view soon after passing Fluela is glorious, stretching far to the north-east along the whole length of the Under Engadine, and embracing the Austrian Tyrol and the great Ortler Spitz. The green and fertile valley, with its well-wooded ravines, its white church-marked villages, its commanding castles, Ardetz and Tarasp, and its silvery stream, is enclosed by huge rugged mountains, whose dark grey sides are relieved in tone by more than one great glittering glacier field.

By many a zigzag the road runs rapidly down to Süs, twenty-two miles from Davos, where it strikes the valley of the Inn, and thence onward to Tarasp. High up on the left are perched on sunny

spots ruined towers with clustering old houses and plots of grain; down below are luxuriant meadows, through which rushes, in many a noisy struggle, the white-watered Inn, and over on the other side are steep wooded banks, backed by the everlasting hills. It is a charming drive from Landquart, but a long one, and the Kurhaus at Tarasp is no unwelcome sight. Twelve hours on a diligence over some sixty miles of mountain road, albeit marvellously good, is somewhat of a tiring expedition. But if weakness compel, the drive may be divided, and a halt made for the night at Davos; or, on the other hand, if time and strength permit, the pass may be walked over, and the glories of the district more leisurely absorbed.

TARASP.

The valley of the Inn, stretching itself for fifty-seven miles, from the source of the river on the northern slopes of the Bernina Alps, to the frontier town of Martinsbrück, by the Finstermüntz Pass, is well divided by physical conformation, by climatic circumstances, and by natural products, into the Upper and Under Engadine. The former, rugged hard and grand in its mountain scenery, is dry and clear and rare in its air, and cool, but withal rapidly variable, in its temperature; the latter, calmer in its aspect by the retreat of the great mountains, is softer and milder in its air, and warmer and more equable in its temperature. Corn and vegetables, grown with much trouble and strife in the higher valley, flourish, along with not unfrequent fruit orchards, in the lower, and testify to the mildness produced by more than 2000 feet lower elevation; and yet all the buoyancy and purity of an Alpine atmosphere is experienced, for Tarasp is well nigh 4000 feet above the level of the sea.

The village of Schuls, over whose grey-topped houses rises in picturesque height the slender red-capped minaret-looking tower of its church, lies on the left bank of the Inn, somewhat above the level of the stream. Deep meadows, intermingled with fields of barley and of rye, are close around; undulating pasture grounds rise rapidly upward among pinewoods, and, backed by Piz Champatsch, form a great screen from the north winds. Over the river, on the south, are wooded knolls, and beyond them a grand chain of mountain peaks, Piz Pisog, Piz St. John, Piz Lischanna, Piz Ajuz, their feet clothed with green larch and slender birch and black pine, and rearing aloft their bare, jagged, almost untrodden

pinnacles, to a height of 10,000 feet or more. As the river leaves the narrow gorge from the west it has left on its northern bank, between it and the post road, and on a lower level than the open plateau on which Schuls stands, a sheltered spot of level ground, the site of the KURHAUS OF TARASP. Facing the south, and closely backed by steep hills, it is protected altogether from northerly winds. In front there is a pretty garden, the rushing river, and a fir-clad hill-side. A covered bridge close by leads to the south bank, on which, a little lower down the stream, is the somewhat primitive hut, where the chief alkaline water is obtained. The house is thus closely sheltered and low-lying; for some tastes too much so; but as two minutes' walk up a zigzag path brings one on to the open Schuls road, its proximity to the source of the waters more than counterbalances this objection. For those to whom a mile's walk to the waters is no impediment good quarters and comfortable may be obtained at Schuls.

Crossing the bridge, and following for ten minutes a pretty winding road, now in sun and now in shadow, one reaches the pleasant grassy height on which VULPERA stands. Here are several Pensions, prettily situated it is true, but, according to my information, not very eligible as resting places for English ladies. In all directions are beautiful walks, on open sunny wind-swept heights, in shady cool sheltered woods, among flower-bestrewn meadows, or over barren crags. The invalid may find idle loitering in shade or in sunshine, and the strong may find hard work among the wild valleys and upon glacier-clad heights.

THE KURHAUS.

A great, unornamented, whitewashed building, there is a homeliness about the outside of the Kurhaus, which promises quiet, cleanliness, and comfort; and the promise is kept. The private rooms are good and comfortably furnished; sitting rooms may be had separate from the bed rooms; or a large airy sitting room, with beds in an alcove, may be chosen; and the beds are very comfortable and very clean. The public rooms, drawing room, coffee room, billiard room, and dining room, are spacious and pleasant; the latter is really a magnificent hall, with a perfect ceiling of polished pine. The house accommodates three hundred guests. There is a chapel for Divine Service, according to the ritual of the Church of England, and a resident chaplain, the Rev. A. Whitby. His un-

wearied kindness and zeal in endeavouring to secure their comfort cannot be forgotten by any of his countrymen or countrywomen who have stayed at Tarasp. In this matter I owe him, myself, many thanks, and I gratefully offer them. The two corridors, along which are ranged the baths, separated from each other and enclosed by wooden partitions, are in the basement of the east wing. The baths are of wood, and each can be supplied with pure water, with salt water, or with iron water at pleasure; heated at the time of using by the admission of steam. Close by is the resident physician's room, Dr. Killias; to whom I again offer my hearty thanks for the courteous way in which he has put at my disposal much valuable information.

The food is good, and well cooked; but some of the dishes were, to my taste, too rich in butter, and—shall I say it?—now and then perhaps with too strong a flavour of the all-pervading onion. Dinner during last year was at one o'clock; it would have been better at six, and I believe arrangements have been made this season for a *table d'hôte* about the latter hour. The charges are moderate.

THE CLIMATE.

Foremost among the circumstances which combine to render a place fitted for the cure and care of invalids is a favourable climate. In this regard Tarasp stands well, and it cannot be doubted that the beneficial influence of its waters is largely aided and supplemented by its situation and the conditions thence arising. All the advantages of an Alpine atmosphere are here experienced, the buoyancy, the purity, and the vigour of the air; but the counterbalancing disadvantages, the rapid change from scorching heat to freezing cold, the sudden snow-falls, the thick raw mists, are rare; a happy exemption, which is largely owing to the situation of Tarasp in relation to the surrounding mountains.

Wind.—Situated on the river and between hills, the wind at the Kurhaus takes, upward or downward, the direction of the stream. For this reason Dr. Killias has made no observations on the wind direction there, but has made use of Schuls as a station for this purpose.

The following table shows the result of observations made at Schuls, three times daily, during the summer season of 1869; but this was an admittedly favourable year.

DIRECTION OF THE WIND AT SCHULS.

MONTH.—1869.	S.	S.E.	E.	N.E.	Stormy Days.
June	19	48	32	1	2
July	3	84	13	0	1
August	0	71	26	3	1
September	7	37	53	3	0
Per centage during season	7	60	31	2	Four days during season.

I do not look upon this question of wind direction as of very great importance: reflection from mountain sides and diversion along ravines must soon alter the original course of a wind. Shortly it may be said that Schuls is protected largely from the north wind by the great Silvretta range, and from the south wind, which is often a cold storm wind, by the chain of which Piz Pisog forms a prominent feature.

Rain.—Much more valuable than the wind current, as a guide to the worth of a place as a health resort, is the rainfall. Dr. Killias has no rain-guage at Tarasp, and so again he takes his observations at Schuls, which, distant in a direct line little more than a mile, is practically the same. In the following table, which, unfortunately, is not quite complete, the number of rainy days was noted at the Kurhaus, and the amount which fell at Schuls.

RAINFALL AT TARASP-SCHULS.

YEAR.	June.		July.		August.		September.	
	No. of Rainy Days.	Rainfall in Millemetres	No. of Rainy Days.	Rainfall in Millemetres	No. of Rainy Days.	Rainfall in Millemetres	No. of Rainy Days.	Rainfall in Millemetres
1869	10	56·2	12	34·8	12	100·6	5	38·4
1870	3	?	16	83·5	22	?	?	?
1871	8	39·9	14	?	17	?	6	?

It is thus seen that during the sixty-two days of July and August there were, in 1869, twenty-four days on which rain fell; in 1870, thirty-eight; and in 1871, thirty-one. But it must be noted that whenever the rain fell, even for five minutes, the day was registered; and that, as a rule, the downfall is mostly a short-lasting shower, very quickly drying up. Indeed, during the seven-

teen days I was at Tarasp last year there was only one day on which rain fell in any quantity, and that was during a thunderstorm, which lasted three hours or more. Very often about ten o'clock at night there was a short sharp shower, which refreshed and brightened everything.

Although the Under Engadine is subject during summer, from its position amongst mountains and glaciers, to frequent showers, yet the total amount of rainfall in this valley contrasts favourably with that of the adjacent valleys, as the following table shows. The observations for the Prättigau valley were taken at Klosters, 3953 feet above the level of the sea; those for the Davos valley at Davos am Platz, 5105 feet high; those for the Upper Engadine, at Bevers, 5609 feet high; and those for the Under Engadine, for the year 1867, at Remüss, 4022 feet high; for 1868, at Zernetz, 4911 feet high; and for 1869, at Schuls, 3970 feet high. The table is taken from *Eidgen. Meteorol. Beobacht. redigirt v. Prof. Wolf.*

RAINFALL IN THE UNDER ENGADINE AND THE NEIGHBOURING VALLEYS.

		Prättigau.		Davos.		Upper Engadine.		Under Engadine.	
Year.	Month.	No. of Rainy Days.	Rainfall in Millemetres.	No. of Rainy Days.	Rainfall in Millemetres.	No. of Rainy Days.	Rainfall in Millemetres.	No. of Rainy Days.	Rainfall in Millemetres.
1867	June	16	104·2	19	65·6	16	88·0	17	76·0
	July.....	14	71·7	17	46·0	15	70·9	12	20·3
	August ..	12	76·1	12	76·1	17	62·3	13	37·1
	September.	10	99·6	12	80·5	12	120·6	12	141·7
	Total..	52	351·6	60	268·2	60	341·8	54	275·1
1868	June	19	115·6	18	111·7	18	89·7	15	101·2
	July.....	18	184·8	22	127·7	22	120·8	17	114·5
	August ..	15	167·5	16	107·8	16	65·4	10	74·4
	September.	12	118·0	13	103·8	18	180·9	8	100·4
	Total ..	64	585·7	69	451·0	74	456·8	50	390·5
1869	June	16	159·1	15	117·8	15	108·9	13	69·6
	July.....	8	88.9	16	61·5	12	54·2	11	34·8
	August ..	11	155·2	18	141·5	15	94·8	15	100·6
	September.	10	82·3	9	65·9	9	69·1	8	57·9
	Total ..	45	485·5	58	386·7	51	327·0	47	262·9

But the Under Engadine not only contrasts favourably in the amount of its rainfall with neighbouring valleys during summer,

but the absolute amount of rain which falls during the entire year is there much less than the amount which is registered in other parts of Switzerland. The following table shows that if the average rainfall, of the four years, 1864-1867, at Remüs (4022′) in the Lower Engadine, which lies a little nearer the Austrian Tyrol than Tarasp, and which is the nearest place to Tarasp of which I have a record, be taken as 1; that of Andermatt (4642′), in the valley of Uri, for a similar period, is 2·2; that of Schwyz (1686′), near the Lake of Lucerne, is 3; that of Montreux (1100′), on the lake of Geneva, is 2·3; and that of Basel (871′), on the Rhine, is 1·6.

ANNUAL RAINFALL IN MILLEMETRES.

	Remüs.	Andermatt.	Schwytz.	Montreux.	Basel.	Chur.
1864	553·9	1126·0	1464·3	892·8	808·3	712·0
1865	579·4	?	1590·7	1206·9	762·4	766·4
1866	573·2	1313·9	1731·0	1631·4	952·1	816·8
1867	607·4	1334·0	2103·9	1636·8	1250·6	913·0

Lastly, it must be noted that mist hardly ever falls in the valley of Schuls, although the higher lying villages are not infrequently enveloped in it.

Temperature.—The Under Engadine generally is much less subject to rapid fluctuations of temperature than the Upper Engadine; indeed, for a high-lying Alpine valley, its climate is remarkably even.

Dr. Killias has kindly furnished me with the tabular abstract which follows of his observations on the temperature during the latter half of June, the whole of July and August, and the former half of September, for the years 1869-71. The average medium day temperature of June, during these years, was 13·17° C. (56° F.); of July, 16·94° C. (62·5° F.); of August, 13·8° C. (57° F.); and of September, 14.46° C. (58° F.) The highest day temperature in the shade was 27·1° C. (81° F.) in June; 29·2° C. (85° F.) in July; 26·6° C. (79° F.) in August; and 22·5° C. (72° F.) in September. The lowest day temperature was 6·1° C. (43° F.) in June; 5·5° C. (42° F.) in July; 5° C. (41° F.) in August; and 6·1° C. (43° F.) in September. I am, unfortunately, able to present the record of one night temperature only, and that is, 6·5° C. (43° F.) in August, 1869; it is clear that there must be very many colder nights than this, and more especially in June and September.

SUMMER TEMPERATURE AT TARASP-SCHULS.

The observations with an asterisk affixed were made at Schuls, the others at the Kurhaus.

MONTH	YEAR.	Highest.		Lowest.		Mean.		Mean of Hottest Days.		Mean of Coldest Days.	
		Cent.	Fah.	Cent.	Fah.	Cent.	Fah.	Cent.	Fah.	Cent.	Fah.
June (16—30)	1869	21·4*	70·5*	6·1*	43·0*	10·28*	50·5*	15·8*	60·0*	6·9*	44·0*
	1870	25·4*	77·5*	8·9*	48·0*	13·73*	57·0*	18·7*	65·5*	10·2*	50·5*
		27·1	80·7	8·5	47·0	15·50	59·7	19·1	67·0	12·5	55·0
July	1869	29·2*	84·5*	10·1*	50·3*	18·13*	65·0*	22·7*	73·0*	12·7*	55·0*
		28·2	82·7	10·2	50·5	17·06	62·1	22·0	71·6	12·6	55·0
	1870	26·6*	79·5*	7·2*	45·0*	17·17*	63·0*	22·4*	72·5*	10·7*	51·0*
		26·5	79·5	7·4	45·3	16·50	61·0	19·9	68·0	10·9	51·5
	1871	26·0	78·8	5·5	42·0	15·84	60·0	19.6	67·5	12·2	54·0
Aug.	1869	26·6*	79·5*	6·7*	43·5*	13·85*	57·0*	17·5*	63·3*	9·4*	49·0*
		25·4	77·7	8·3	47·0	13·66	56·7	17·5	63·3	11·2	52·0
	1870	21·8	71·0	5·0	41·0	12·87	55·0	17·3	63·2	8·5	47·0
	1871	22·6	72·5	6·5	43·5	14·73	58·5	17·7	63·5	10·8	51·0
Sept. (1—16)	1869	22·5*	72·5*	6·1*	43·0*	13·9 *	57·0*	17·4*	63·3*	10·9*	51·5*
	1871	22·2	72·0	10·5	51·0	15·02	59·0	16·7	61·5	13·4	56·0

The reductions of Centigrade to Fahrenheit degrees do not profess to be accurate to fractions of a degree, but are intended to be a near approximation.

Sunshine.—Beyond the healthful influences of a warm climate and a pure air, and perhaps even above them, must be numbered the powerful effects of direct sunlight. And, although the true cause of the necessity of direct sunlight for the existence of good health is not yet fully demonstrated, there can be no doubt that the actinic rays must exert a powerful influence on the human body, just as they do on photographic silver paper, or the colouring matters of plants. The brilliant hues of the blue gentian and the scarlet flowering flax bear vivid testimony to the high value of direct sunlight in the production of chlorophyl in the leaves of plants, and its modifications in the flowers. Tissue change in vegetables and in animals is quickened into greater activity on a mountain top, for not only is the power of the atmospheric oxygen relatively increased by the absence of contaminations, but it is positively intensified by the presence of a greater amount of actinic rays. The table I now give from Dr. Killias's records shows the condition of the sky in monthly averages from observations made three times daily. The designation "Clear" is used when no clouds were to be seen; "Mixed," when floating clouds were observed; and "Overcast," when tho cloudiness was complete.

ASPECT OF THE SKY IN MONTHLY PER-CENTAGES.

MONTH.	YEAR.	Clear.	Mixed.	Overcast.
June 16—30.	1870	23·0	56·0	21·0
July	1869	21·0	58·5	20·0
	1870	20·0	40·0	30·0
	1871	32·0	46·0	22·0
August.....	1869	22·5	47·5	59·0
	1870	11·0	52·0	38·0
	1871	32·0	43·0	25·0
September 1—16. ..	1871	45·0	35·0	20·0

Barometer.—Of the barometrical pressure I am only able to report that the medium height of the mercury may be taken at about 660 millemetres (25·98 in.)

In brief, then, it may be said of the climate of Tarasp, that, while retaining the sunshine and the bracing and inspiriting properties of higher Alpine situations, it is milder and less irritating, from its greater moisture, its greater warmth, and its greater equability.

MINERAL WATERS.

Springs, more or less charged with mineral matters, abound in the neighbourhood of Tarasp. Dr. Killias describes twenty sources, of which fourteen are distinguished by their chalybeate properties, four are essentially alkaline, and two sulphurous. No attention is paid to the sulphur waters at Tarasp, and the sources are some distance from the Kurhaus.

It is unnecessary for my present purpose to describe in detail the several springs; the matter may be best considered under the two heads,—alkaline purgative waters, and iron waters.

At the outset it must especially be noticed that both classes are well charged with carbonic acid gas, and that there is no absolute opposition of composition in the two kinds of water, but rather that each obtains its special characteristics by the greater or less predominance of individual salts common to both; a fact which is shown by the following abstract of Dr. A. v. Planta's analysis of the chief Tarasp waters.

It may also be seen from the table that these waters when taken,

as they often are, to the amount of thirty to forty ounces daily for three or four weeks in succession, must have an important action on the human economy; good in the right cases, but unmistakably injurious in the wrong ones, as I had several opportunities of observing during my visit.

TARASP WATERS.

CONSTITUENTS. Grains in Sixteen Ounces.	ALKALINE WATERS.			IRON WATERS.	
	Lucius.	Emerita.	Ursus.	Bonifacius.	Wy.
Alkaline Carbonates	44·7381	45·9142	37·8339	25·1242	10·1436
Alkaline Sulphates	19·5448	19.7536	14·1488	2·3822	·1704
Iron & Magnesium .... Carbonates	·1520	·1397	·1036	·2534	·2165
Sodium Chloride	29·4013	29·3813	22·1752	7·9296	·0284

ALKALINE PURGATIVE WATERS.

The springs in use are the St. Lucius, and sometimes the Emerita, for drinking, and the Ursus for bathing purposes.

The Lucius water is bright and sparkling, and, when taken fresh and cold, is of a not unpleasant, pungent, salt taste; when the carbonic acid is driven off by warming it is more unpleasant. Its temperature is 6·2° C. (43° F.); and its specific gravity 1·013.

The Emerita water is very similar, but it contains less carbonic acid. Its temperature is 6·2° C. (43° F.), and its specific gravity 1·0129.

The Ursus water and that of the New Bath spring rising closely to it have a temperature of 8·1° C. (46·5° F.), and a specific gravity of 1·0104.

The chief characteristic of these waters is the abundance of alkaline carbonates in conjunction with alkaline sulphates. Springs of this kind are rare; there are none in England, and few on the continent. Another and very important peculiarity of the Tarasp alkaline water is the presence of iron carbonate in notable quantity; in about the same proportion, indeed, as in the Tewitt well at Harrogate.

The following table is from Dr. Killias's book on Tarasp-Schuls.

TARASP ALKALINE WATERS.

Analysis by Dr. A. v. Planta.

CONSTITUENTS. Grains in Sixteen Ounces.	Lucius.	Emerita.	Ursus.
Calcium Carbonate	12·4323	12·4016	10·8702
Sodium ,, ...	27·2294	28·535	22·6222
Magnesium ,, ...	5·0764	4·9766	4·3415
Ferrous ,, ...	·152	·1397	·1036
Sodium Chloride	29·4013	29·3813	22·1752
Sodium Sulphate	16·5473	16.4167	11·9769
Potassium ,, ...	2·9975	3.3369	2·1719
Sodium Iodide	·0015	——	——
Phosphoric Acid.....	·0023	——	——
Silica	·2465	·0921	·1843
Alumina	·0015	——	——
Total Solid Matters ..	94·0880	95·2799	74·4458
Carbonic Acid, cubic inches			
Free and half free	34·8871	33·2712	29·5318
Really free	15·3984	13·3009	13·1627

The Carbonates are most probably really Bicarbonates.

INTERNAL USE.

Mode of Action.—These waters are antacid by means of the carbonates, purgative by means of the sulphates, and restorative by means of the iron, the lime, and the common salt. The quantity of iodine and phosphoric acid is too small to have any influence. The sodium bicarbonate first neutralizes any acid present in the stomach, and, possessing a high diffusive power, is, when in excess, rapidly absorbed into the neighbouring structures and the blood; the magnesium and calcium bicarbonates, having both very much less diffusive power than the sodium salt, are carried on further into the intestines, and neutralize any acid material in them. The sodium sulphate, having a less diffusive power than the carbonate and the chloride, passes on to the intestines and acts as a purgative in proportion to the quantity of water taken. The sodium chloride, present in the water and produced in the stomach by the neutralization of the sodium carbonate, with its high diffusive power must, on the other hand, rapidly permeate the tissues. The iron carbonate and the calcium carbonate are also in great measure absorbed and made use of in the body.

In considering the action of the St. Lucius water when used internally, and of its several chief constituents, the first place must be given to the action of water itself. Taken on an empty or nearly empty

stomach, it is rapidly absorbed into the blood, and again speedily passed out of the body, in great measure by the kidneys, some little by the lungs and skin, and, according to Dr. Mosler's observations, only a very small quantity by the intestines. Increased tissue change is produced; the products of metamorphosis are largely augmented; more fæcal matter passes off by the intestines, and more solid material by the kidneys. It would seem that not only does the urine of persons taking large quantities of water contain more urea and salts, but also more colouring matter, probably from increased destruction of red blood-corpuscles. That water has this influence is capable of negative as well as positive proof, for when an animal is deprived of water the total amount of solids excreted from the body is much diminished. This increased molecular change on the side of destruction is more than compensated, if the excessive water drinking be not too long continued, by increased action on the side of repair. Old dead matter is floated off, and replaced by young living matter, and the result is renewal of structure and of power. The concurrent testimony of clinical observers and experimental physiologists affirms this.

The observations of Rabuteau and Constant show apparently that the amount of urea is diminished by the use of alkaline carbonates, and thus render doubtful the hypothesis that alkalies increase oxidation.

The defecating action of the simple water is largely aided by the alkaline carbonates contained. There is still great uncertainty as to the exact action of alkalies on the body, but this much is certain, that they pass rapidly into the blood, and, rendering it more alkaline, render also the excretions, especially the urine, less acid; whether this results from oxidation of the acid, or from the production of a salt, is as yet unknown. By their continued use the red corpuscles of the blood become fewer, and tissue destruction is more active. The calcium and magnesium carbonates, on the other hand, passing on into the intestines, neutralize excessive acid there, and render the ultimate process of digestion more perfect. The alkaline carbonates probably act chiefly after the absorption, the earthy carbonates before the absorption, of chyle. The one repairing, the other preventing, damage from acid.

The gently purgative action of the sodium sulphate is of prime service, even if the unbelievers in the doctrine of elimination have truth with them; for in the cases fit for Tarasp, a regularly recurring cleansing of the intestinal surface is for a time of no small advantage.

The experiments of MM. Jolyet and Cahours would lead to the conclusion that the sulphates are not purgatives when injected into the blood. They have a low diffusive power, and so pass on into the intestines, fixing there a considerable quantity of water, and probably producing increased watery exhalation from the intestinal surface.

The sodium chloride rapidly diffuses into the tissues. An essential part of the chief structures of the body, its due supply is a nature-taught need; and in many conditions of defective nutrition it becomes an essential requisite of healthier action. And not only is it an important constituent of the chief tissues, but it would appear that the renovation of the structures largely depends on its presence, for when an animal is deprived of salt the urea greatly diminishes in quantity.

The restorative action of the iron is manifest, and the smallness of the dose is no disproof of its power. Very much of the iron prescribed passes off in an inert form by the intestines. The conjunction of iron carbonate and sodium chloride is a happy one, inasmuch as it would appear that iron is more easily and more rapidly absorbed when given along with an alkaline chloride.

The calcium carbonate I take it does not long remain such, but becomes in part calcium chloride, which was of old valued in tubercular conditions of the intestines, and is of marked use in disorders of this degenerate type; and in part, perhaps, calcium phosphate. But, however this may be, the lime salt is an essential part of the human economy.

Mode of Administration.—The water is usually ordered to be taken in three or four doses of six ounces each, in the morning before breakfast, with an interval of ten or fifteen minutes between each dose to be employed in walking. Most take it cold, for some it is warmed. In a large number of cases this is doubtless a good plan, especially in men; but few ladies are benefitted by this course. Dr. Burney Yeo has pointed out in forcible language the evil effects produced at St. Moritz, by this drinking of large quantities of water early in the morning, and the bad effects are not less marked at Tarasp, where, during my stay, I saw several instances of its unwisdom. The long waiting for breakfast after rising, the pint of cold water on an empty stomach, the weary walking in the intervals of the drinking, produce a most undesirable "tubby" condition and great waste of power. For patients of feeble tone, whether original or acquired, the water should be taken in the forenoon and

at bedtime. A moderate dose, six or eight ounces at the end of the day, when digestion is about finished, is of great service. Especially do I think that this is the proper time to give an alkaline water to a patient at home, when not undergoing the so-called "cure." Vichy and Vals water are often ordered to be taken at a meal time; an unwise proceeding I take it. An acid secretion is needed then for digestion purposes; the drinking of an alkaline water neutralizes some of this necessary acid; wastes it in fact; and the end is, either that digestion is imperfectly performed for lack of acid, or that the stomach has an unnecessary, and, so far an injurious, amount of work thrown upon it, in the supply of more acid. Surely the proper time for the taking of an alkaline water is when acid is no longer rightly in the stomach, some two hours after a meal; with our present habits, at nine or ten o'clock at night, instead of the customary cup of tea. The fact, if it be a fact, that alkalies excite the secretion of the gastric juice—alkalies as alkalies, not as physical irritants—does not militate against this proposition: for it is clear that if taken during digestion they must neutralize a certain definite amount of acid which should not be neutralized; and there is clinical evidence sufficient, I think, to prove that when administered with food an alkaline water does little good, and that when given as recommended above does much, in fitting cases.

Some hours after purgation has ceased there is a marked increase in the amount of the urine; the salts which have first diffused into the blood are now passing off. No observations have yet been made of the constituents of the urine under the use of the St. Lucius water.

Dr. Killias says that the unpleasant symptoms which sometimes occur a few days after the beginning of the cure, such as loss of appetite, lassitude, and palpitation, are not to be at once considered discouraging; for many who are at first reduced by the waters make the best recovery.

The quantity of the water taken should depend on the effects produced, as should also the length of time during which they are taken; three weeks is considered the average.

Great stress is laid upon a proper diet; no fresh fruit, no beer, no raw vegetables, such as salad, and no butter or cheese is allowed. But here, I think, as I have told him, Dr. Killias is wrong; he will not allow his patients a little sweet fresh butter with their bread at breakfast, but he allows the cook to send up some of his dishes,

for the one o'clock dinner, swimming in hot butter; potatoes, for instance, floating in it. Indeed, the cooking is, for most English tastes, too greasy, and, I hear, with much gratification, that at the Kurhaus this year more attention to considerations of this nature will be given, and that a *table d'hôte* at five or six in the evening has been started.

Uses.—The St. Lucius water is stated by Dr. Killias to be especially serviceable in those disorders of nutrition, be they glandular in their origin, or dependent on diseased conditions of mucous membrane, which have been brought on by an irregular life; and it may be recommended with confidence in the following forms of disease.

General fatty deposit; corpulence; fatty liver; moderate degrees of fatty heart.

Simple enlargement of the liver, spleen, ovaries, and thyroid.

Liver diseases, under the conditions of hyperæmia, excess or deficiency of bile secretion; jaundice; gallstone.

Chronic catarrh of the stomach, and similar conditions of the intestines, especially the large intestines.

Chronic constipation, and its accompanying complications.

Hypochondriasis, especially if there be abdominal disturbances.

Chronic affections of the mucous membrane of the urinary apparatus, and concretions formed in its course.

Chronic thickening and congestion of uterus, leading to menstrual disturbances.

Scrofula.

Gout and chronic rheumatism.

Chronic bronchial catarrh, especially when accompanied by abdominal congestions.

Possibly in diabetes.

In tænia, at least as an adjuvant.

In chronic eczema, and in those skin disorders which depend on such disturbance of nutritive processes in the chylopoietic viscera as are benefitted by the use of this water.

Contra Indications.—The drinking of the salt water is forbidden in cases of pregnancy, extreme exhaustion, malignant disease, intestinal ulcerations, tubercle, anæmia, epilepsy, and hæmorrhagic diathesis. It is to be used with extreme caution, if other circumstances seem to require it, in all nervous, delicate

neuralgically disposed persons. When I was there I saw several persons of this type, who had been drinking the St. Lucius water without medical advice or supervision, and simply because when at Tarasp they thought it the right thing to drink the water; one and all were greatly lowered and depressed by it.

EXTERNAL USE.

In most cases warm baths are used daily or every second day. For this purpose the Schuls salt water, having a specific gravity of 1·0104, is employed. Here we come on an important and unsettled point: whether water, and substances held in solution by it, are absorbed through the unbroken skin. Contradictory experiments are recorded; contradictory observations have been made; but the positive observations, in my judgment, far outweigh the negative statements; as, indeed, in all cases they should. Putting on one side the historical sailors who relieved their thirst by sitting in wet clothes, and the historical jockey who was made too heavy to ride by taking a warm bath before the race, there are many direct observations of increase of weight after a warm bath. Lehmann long ago related six observations on the amount of urine passed after a quarter of an hour in a sitz bath, at from 48° to 60° F., and in which the amount of urine was increased nearly one-third, and the solids one-fifth. A similar observation has been made by Clemens, where the urine was nearly doubled, and the phosphates still further increased, but the urea shewed only a slight addition. Some careful experiments have been made by Hoffman, who has come to the conclusion in regard to chloride of sodium, among other agents, that it is slowly absorbed by the skin when in watery solution. Ritter, Clemens, and others, on the contrary, deny the power of the skin to take up aqueous solutions of salts, but admit the power of the skin to take up salts when rubbed into it with some greasy material. Kirejeff concludes from his experiments that very little water is absorbed from a warm bath, that the quantity of the urine is not increased, but that its solid contents are; the urea, uric acid, and non-volatile salts partaking most largely of the increase. All observers agree that the urine is rendered alkaline by a simple warm bath. Iodide of potassium has been found in the urine after a warm bath in which that substance was dissolved. But it must be admitted that the observations and experiments are contradictory. In Dr. Waller's very interesting paper in *The Practitioner* of 1869, on the influence of chloroform in promoting cutaneous absorption, he

rejects the idea that it does so in consequence of its dissolving the sebaceous secretion, and so rendering the skin capable of absorption, and the experiments he records would seem to justify the conclusion. But it is clear that the presence of this sebaceous secretion and of the superficial shedding layer of dead epidermic scales must be very antagonistic to the diffusion of watery fluid into and through the skin; indeed, daily observation in the bath shows it. At Tarasp, this antagonistic influence is destroyed by the maceration of the body, for twenty minutes or half an hour, in a more or less heated alkaline water, which saponifies and dissolves the oily secretion, loosens and removes the scaly epidermis, soaks into the deeper layer of cells and lymphatic spaces, and must thence be diffused into the blood vessels and lymphatics; probably chiefly into the latter, in consequence of the greater thinness of their coats, or it may be, as modern observation seems to show, through orifices or stomata in their walls.

But the diminution of acid in the urine, which immediately follows the use of these baths, is not necessarily dependent on direct increase of the alkalinity of the blood. Out of the many millions of sweat glands with which the human body is endowed, there is at all times being poured out, in vapour or in fluid, a watery exhalation, containing formic, acetic, butyric, and other volatile organic acids. This transpiration goes on more actively in the warm alkaline bath, which, soaking into the tissues, encourages the secretion, and, dialysing through the thin walls of the sweat tubes, neutralizes the acids at the moment of formation or of separation.

The value of the alkaline warm bath is much overlooked. It may be extemporized by the addition of a tablespoonful of sodium bicarbonate to the quantity of water necessary for a sitz bath, and may be used with great advantage, not only in external disorders, such as chronic eczema, but also in in gout, chronic rheumatism, and disorders of digestion, be they of stomach, small intestine, liver, or pancreas, where uric acid and urates are in excess in the urine. In acute rheumatism, frequent sponging of the body with hot water in which sodium bicarbonate is dissolved, gives vast comfort and is of great service. An alkaline warm bath, either general or local, is seldom without its good effects in febrile conditions generally.

IRON WATERS.

The chalybeate springs are the Bonifacius and the Wy for drinking, and the Carola for bathing purposes.

Composition.—The Bonifacius spring is situated on the right bank of the Inn, a quarter of an hour's walk above the Kurhaus. It is a bright water, of strongish chalybeate taste, made more palatable by the amount of carbonic acid it contains. Its temperature is 7·5° C. (45·5° F.), and its specific gravity is 1·0029.

The Wy spring, containing less alkaline and earthy salts, is a most agreeable and refreshing chalybeate. Its temperature is 8·7° C. (47·7° F.), and its specific gravity is 1·002.

The Carola spring has a temperature of 6° C. (42·8° F.), and a specific gravity of 1·0011.

TARASP IRON WATERS.

Analysis by Dr. A. v. Planta.

CONSTITUENTS. Grains in Sixteen Ounces.	Bonifacius.	Wy.	Carola.
Ferrous Carbonate.....	·2534	·2035	·1259
Manganese ,, ...	——	·0130	——
Sodium ,, ...	7·9296	·0284	——
Calcium ,, ...	14·6096	9·4671	4·2071
Magnesium ,, ...	2·5850	·6481	·8094
Sodium Chloride.....	·4377	·0161	·0168
Magnesium ,, ...	——	——	·0146
Sodium Sulphate	1·6488	·0867	·2825
Potassium ,, ...	·7334	·0837	·4992
Phosphoric Acid.....	——	·0015	——
Silicic ,, ...	·142	·1474	·0737
Alumina	——	·0007	——
Total solid matters..	28·3395	10·6962	7·1612
Carbonic Acid			
Free and half-free ..	28·5810	22·1498	22·3224
Really free	17·4120	17·5526	17·5872

Mode of Action.—The restorative action of the iron is, in my estimation, largely aided in the majority of cases by the calcium chloride; and its absorption, as mentioned above, is facilitated by the presence of sodium chloride. The carbonic acid in excess presents the iron to the stomach in the form best fitted for assimilation.

Mode of Administration.—Dr. Killias orders these waters in the same manner and time as the alkaline waters. Here again

I would express the opinion that the drinking before breakfast is often prejudicial, and more especially in delicate well-nurtured females. Iron waters, it seems to me, are best given two hours after a meal. Fresh cow's milk is often added with advantage; a good vehicle, I may in passing observe, for the administration of iron in children, and a pleasant one.

Uses.—The value of these springs is obvious, and the cases for which they are fitted are, anæmic conditions generally, chronic bronchial and laryngeal catarrh, chronic cystitis, chronic Bright's disease, and some neuralgic affections. They may often be advantageously used after a course of the alkaline water.

External Use.—In many cases Dr. Killias orders baths of the iron water, but of a lower temperature than the alkaline water baths. The value of chalybeate baths is very problematical, and as in the Carola spring, the bath water, there is no sodium bicarbonate, and little calcium bicarbonate, it is doubtful whether this form of use has any other influence than that of water made more stimulating to the skin circulation by the presence of carbonic acid.

THE TARASP TREATMENT IN DISEASE.

[This section is a translation of Dr. Killias' reply to my request to give me his latest opinions of the value and use of the Tarasp waters, in certain special diseases which I enumerated; and I thank him for his courtesy in giving me so full an account, and in the form I asked.]

RHEUMATISM: CHRONIC FORM.

Spring.—Lucius water, four to six glasses daily. Alkaline bath daily. I have seen no cases of *arthritis deformans*, but in cases of thickened and stiffened joints from chronic rheumatism I have seen good results, not only in the functional alleviation and strengthening of the damaged joints, but also in regard to the usually accompanying excessive acidity of the urine.

Favourable Signs.—An increase of pains at the commencement is, as in true neuralgic affections, rather a favourable symptom, inasmuch as it shows that the remedy is acting on the organism. Afterward occur remission of pains, greater freedom of motion, and increase of strength. When the cure really succeeds, it is seldom that complete evidence thereof is shown during the use of the waters, but more often in the course of the after-cure.

Unfavourable Signs.—Excessive increase of the pains, constant sleeplessness, and violent palpitation of the heart.

Length of Treatment.—Four to five weeks.

GOUT.

Spring.—As in rheumatism. The baths as warm as possible. I have seen no evidence of absorption of real chalk stones.

[During my visit, I saw two cases where a gouty deposit had apparently decreased in size; this was probably from absorption of the inflammatory thickening surrounding the earthy concretion. In weakly patients, I think that the alkaline bath only should be used.—L.W.S.]

Favourable Signs.—Much as in rheumatism. The acid reaction of the urine is especially to be marked, (and for this the Lucius water is of especial efficacy,) as its diminution is a demonstration of the improved blood-composition, and consequently of a weakening of the gouty diathesis. Abundant urinary deposits are, as in rheumatism, to be desired.

Unfavourable Signs.—As in rheumatism, and as set forth in the general remarks.

Length of Treatment.—Four to six weeks.

SECONDARY SYPHILIS.

Spring.—Pure alkaline waters are altogether useless in this disorder. Specially I refer to Carlsbad, so much acknowledged and praised by the otherwise nihilistic Vienna school as a therapeutic agent. There have come before me at Tarasp a few cases of syphilis, and in these I have used an admixture of sodium iodide with the Lucius water, and the result was not unsatisfactory, but I cannot relate any beneficial action of the Tarasp water alone. In the management of syphilis the health apparatus of a mineral spring can only be reckoned, in my conviction, amongst the adjuvantia, and for this purpose places with favourable climatic circumstances, and springs which contain iodine or bromine, as for instance Tarasp, should be chosen.

Length of Treatment.—Not under four weeks.

CANCER.

In this disease, Tarasp is positively contra-indicated.

BENIGNANT TUMOURS.

Spring.—The Lucius water. The prognosis of this class of disease is not easy to determine, because one can only seldom judge of the structure of the tumour in regard to the possibility of absorption. It is of little use to attempt the Tarasp treatment in fibroid, enchondroma, vascular tumours, and such like. It is another matter where the point is the removal of absorbable substance in deposits and swellings of glandular organs from fat; here Tarasp water is often of surprising use; although I have known it when used with all energy of no avail.

Baths should under these circumstances be used.

Unfavourable Signs.—It may certainly be expected that injury will result if a mistake in diagnosis has been made, and the tumour turn out to be scirrhous.

Length of Treatment.—Probably from three to six weeks.

SCROFULA.

In the torpid lymphatic form, not the erethitic.

Spring.—The Lucius water in moderate doses, two to five glasses daily, according to age. Alkaline baths daily. Contemporaneous use of, or after treatment with, according to circumstances, the iron water.

Favourable Symptoms.—Increase of the appetite, and better countenance, as evidence of an improved tissue change.

Unfavourable Circumstances. — Loss of appetite, debility, diarrhœa.

Length of Treatment.—Four to six weeks.

DIABETES.

Spring.—My small personal experience of this disease gives me no opportunity of reporting on the suitability of the Tarasp treatment. But I am convinced that our various springs and the accompanying climatic conditions could not be without some real influence. Experiments, which Professor Dietrich, of Munich, has made with the Lucius water speak thoroughly in its favour.

Length of Treatment.—The treatment must, in my view, be cautiously attempted, and from the beginning, small doses should be used. Probably the course should be prolonged, to at least six weeks.

ANÆMIA.

Spring.—The Bonifacius or Wy water; three or four glasses in the morning, and frequently one or two in the evening. The iron water bath daily. Strengthening diet; wine. Sometimes I allow a glass of the Lucius water to be taken if the iron water produces constipation. In some cases, when the iron water is not well digested, or otherwise disagrees, the use of small doses (two to four half glasses) of Lucius water in the morning, and the addition of fresh milk in the evening, is of great service.

Favourable Signs.—Improvement of the countenance and strength; appearance of the menses in women; increase of weight.

Unfavourable Signs.—Congestion and giddiness; epistaxis.

Length of Treatment.—Three to four weeks.

BRAIN DISEASE.

Paralysis. Locomotor Ataxy. Progressive Muscular Atrophy.

Spring.—In this disease-group one can only advise treatment at Tarasp,—

(1) When through its action on and reduction in size of a tumour, pressure symptoms may be lessened;

(2) When the point in question is simply increase of strength by a tonic management.

In some similar cases which have recently come before me I have given sometimes the Lucius water, and sometimes the chalybeate water, but I have never ventured on great doses, and I have always placed my chief reliance on general dietetic treatment. Electricity is a useful accessory.

Unfavourable Symptoms. — Symptoms of brain congestion; neuralgic occurrences; increase of sleeplessness.

Length of Treatment.—Indefinite. When things are going on well the patient should stay as long as possible.

NEURALGIA.

Spring.—Here the choice of water will depend on the special form of the disease. In general, however, the Lucius water is not to be recommended in neuralgic disorders. I have repeatedly had to leave off treatment even when very cautiously used, in consequence of increase of pain. Once, in Migraine, I have seen continued

relief, in the shortening and alleviation of the attacks.

Unfavourable Signs.—Increase and aggravation of the attacks. The unfavourable action of the Lucius spring in *epilepsy* was of old known here; and in confirmation of this, I have collected very convincing experience, in the instance of epileptics who have persisted in taking the water against all advice. In *sciatica* I cannot praise the water, it irritates. Similarly, in *gastralgia* it is harmful. Neutral hot springs act in these cases much more beneficially.

HEART DISEASES.

1.—Valvular Disease.

Spring.—The drinking of a chalybeate water, along with the use of whey or milk, and other fitting regimen, is not unsuitable in slight cases of aortic stenosis. In more advanced cases the drinking of the Tarasp water must be avoided, for with any great increase of the watery constituents of the blood, apoplectic accidents may be looked for.

Unfavourable Symptoms.—Palpitation; œdema of the feet; giddiness.

Length of Treatment.—Altogether uncertain, for one cannot foretell the progress of the experiment.

2.—Hypertrophy.

Spring.—In moderate grades, a cautious drinking of one or other of the mineral waters, according to circumstances, may be risked.

3.—Fatty Degeneration.

Spring.—In this disease I must, contrary to experience in the other diseases of the heart, give prominence to the sometimes strikingly favourable action of the Lucius water. Among the most suitable, are naturally those cases where fatty deposits, in and about the heart, have been produced in otherwise strong young persons, by excess in eating and drinking. I would give at first the Lucius water, in very moderate doses; one to three half-glasses, and seldom more than three glasses. In addition, a modified Banting's system; and, as after-treatment, the chalybeate water and bath.

Favourable Signs.—A stronger pulse stroke and heart beat; removal of the tightness in breathing, and the asthmatical symptoms; decrease of the diseased yellow tint of skin.

Unfavourable Symptoms.—Increase of the bad symptoms; loss of appetite.

Length of Treatment.—Not less than four weeks.

4.—Angina Pectoris.

The treatment in these cases is, in all respects, one demanding careful research; but my experience does not enable me to speak confidently on the matter.

ATHEROMA OF ARTERIES.

Spring.—Here, as in heart disease, treatment with the Lucius water is only admissible when pursued with the greatest caution, lest the resolving action of the alkaline water, or the stimulating action of the iron water, lead to a rupture of the diseased arterial coats.

BRONCHOCELE.

Spring.—Tarasp has long been famous in the treatment of this affection. The so-called lympathic goitre presents the conditions of the most favourable prognosis. Four to six glasses daily of the Lucius water is the usual treatment.

Length of Treatment.—Three to five weeks.

ADDISON'S DISEASE.

Spring.—No case has come before me. The chalybeate water and bath, and other strengthening treatment, would appear to be advisable.

CHRONIC BRONCHITIS.

Spring.—In this affection, especially when the bronchial secretion is got up with difficulty, Lucius water serves well. I give moderate doses; four or five half glasses, mixed with warm milk, when great irritability is present. In torpid forms, and where at the same time abdominal congestions exist, I allow still more to be drank. Baths act most beneficially; sometimes I employ chiefly the alkaline bath, sometimes chiefly the iron bath. Where there is a suspicion of tuberculosis, the use of the Lucius water requires much caution, and I prefer the iron water. Three or four half-glasses, with milk.

Favourable Signs.—Free expectoration and gradual diminution of the bronchial secretion and the dyspnœa.

Unfavourable Signs.—Increase of fever; bloody sputa.

Length of Cure.—Three to four weeks.

CHRONIC PNEUMONIA.

Such cases have not come before me.

PHTHISIS.

Spring.—In pronounced cases of this disease Lucius water is distinctly contra-indicated. The iron water, on the contrary, may be cautiously used in conjunction with other fitting therapeutical and dietetical remedies.

On the other hand, I am convinced that the climatic conditions of Tarasp, and still more of the higher-lying districts of the Under Engadine, promise profit in the treatment of phthisis and the mastering of the phthisical disposition. The chief advantages of this climate, of which I cannot here speak further, are—

(1) The benefit of the diminished air pressure, combined with higher medium temperature than in other alpine valleys.

(2) The protection against the north and north-east wind as well as against the local glacier winds.

(3) The pure clear air, not laden with moisture, but in no way dry or irritating. Mist is infrequent and rainfall small. The left side of the valley (especially the higher-lying villages, as Guarda and Vettan, which I have particularly in my eye) enjoys, during the whole day, full exposure to the sunshine.

(4) Milk and spring water of the best quality. Level roads on the terraces, where the villages lie.

DYSPEPSIA.

Spring.—Lucius water in not too strong doses; three or four glasses in the morning, so as to produce only one or two motions. Avoidance of fatty, acid, and sugary foods, fruits and pastry. Baths are useful when there are cardialgic complications or engorgements of the liver.

Favourable Signs. — Return of the appetite; abatement of heartburn and oppression.

Unfavourable Signs. — Increase of complaints shows, with

only few exceptions, that the waters will not agree, and that they had better be discontinued. In such cases a favourable result can still be accomplished by the use of the alkaline baths only, in conjunction with a fitting regimen.

Length of Treatment.—Usually three weeks.

DYSENTERY.

Spring.—The acute febrile form does not concern us here. On the other hand, in chronic catarrh of the large intestine, with the characteristic stools, I have attained very satisfactory results by the daily use of small doses of the Lucius water, two to three half glasses, mixed with milk, and a simultaneous daily use of the chalybeate bath. These good results I have attained after the treatment at other baths had failed.

Favourable Signs.—Greater consistence of the stools.

Unfavourable Signs.—Increase of diarrhœa and of pain.

Length of Treatment.—Four weeks.

CONSTIPATION.

Spring.—For this disease many come to Tarasp, because those afflicted with it obtain there a lasting improvement and increase of bowel activity. The daily dose of Lucius or Emerita water, which latter often acts uncommonly well as a purgative, is four to six or seven glasses, either altogether in the morning or partially in the evening also. Baths are not always of remarkable utility. When this amount of water does not act as a purgative it is better to assist its action by an ordinary pill, or by two or three drachms of sodium sulphate, than to give immense doses of the water. But this addition is mostly needed for only a short time.

Unfavourable Signs.—Violent flatulence and congestion; profuse watery stools.

Length of Treatment.—Three or four weeks.

LIVER DISEASES.

1.—Abscess.

Here treatment at Tarasp in contra-indicated.

2.—Simple Enlargement.

Spring.—In these cases the result is to be awaited with confidence. Four glasses of Lucius water should be taken daily with an alkaline bath and meat diet.

3.—Fatty Degeneration.

Spring.—Cases which depend upon excessive deposit of fat may, with rich results, be treated at Tarasp with four to six glasses of Lucius water daily, alkaline baths, and avoidance of an excess of saccharine and farinaceous food. Where the liver cells themselves are destroyed by fatty degeneration, a palliative help can, in the most favourable cases only, be afforded.

Length of Treatment.—Four weeks and longer.

4.—Cirrhosis.

Here treatment would be altogether without result.

5.—Jaundice.

Spring.—Cases which depend upon biliary congestion from catarrh of gall-ducts offer the best prognosis. Cases depending upon disorganisation of the liver parenchyma are often incurable. Three to five glasses of Lucius water and an alkaline bath daily. Chiefly a nitrogenous diet, and no excess in exercise.

Favourable Signs.—Removal of the biliary colouring matter from the urine, a better colour of the fæces, and improvement of appetite.

Unfavourable Signs.—Feverishness, inclination to vomit, with no alteration of the icteritic appearance.

Length of Treatment.—Three weeks.

6.—Gallstones.

Spring.—The result is often excellent and surprising; and therefore the treatment must be carefully supervised, lest too violent a crisis result. Two to four glasses of Lucius water; a daily alkaline bath; scanty diet.

Favourable Signs.—When pain commences in the region of the gall bladder I stop the treatment, and apply cataplasms. But at times the stones pass without pain.

Length of Treatment.—Three to five weeks.

Herr J., Swiss, had suffered for some time with gallstone colic, for which he had the last time used Carlsbad water without effect. In 1866 he was under treatment at Tarasp for twenty-four days; the doses of Lucius water never exceeded four glasses in the day, along with alkaline baths. On the tenth day he passed the first gallstone; the following night he was restless and complained of pain. From this time he passed, without pain, a stone every two or three days. The patient left Tarasp perfectly well, and I have since repeatedly heard of his well-doing.

Herr M., Swiss, sought Tarasp in 1870, chiefly for his recreation and the relief of a slight digestion-trouble. On the first day he drank six glasses of Lucius water, and took a somewhat laborious walk. In the evening he sought my help for an insupportable pain in the hepatic region. I found him well-nigh fainting from the characteristic symptoms of gallstone colic. He was at once sent to bed, and I did what was necessary for the removal of the attack and the consequent febrile condition. With some trouble I persuaded the patient to undergo the treatment rationally; I gave him small doses only of water, and in eight days my diagnosis was confirmed by the painless passage of many gallstones. Herr M. had no previous suspicion that he had gallstones, and manifestly his injudicious treatment of himself on the first day in some measure determined the attack of colic.

Frau G., Bern, who had suffered for long from gallstones, came to Tarasp in 1871, in the hope of a radical cure. I diagnosed a quantity of accumulated gallstones by means of percussion and palpation of the epigastrium. After eight days she had acute pain and jaundice. A stone could not be found. I allowed two days to elapse, and then resumed the treatment cautiously. She had been under treatment twenty-five days when a stone, about five times the size of a hazel-nut, passed. Although the tenderness of the liver had subsided I advised a repetition of treatment in the autumn.

[The case in which I was personally interested, and which was the cause of my visit to Tarasp, was greatly benefitted by the course. She had, in the spring of two previous years, suffered acutely for ten or twelve weeks at each time. The diagnosis was confirmed in one attack by the passage of a stone, which was apparently only part of one; it was coated with a firm layer of white cholesterine mixed with calcareous matter, except at one side, which was dark coloured and rough, and presented the appearance of a fractured surface. During the two years there had been frequent slight attacks of pain, and often quickly passing symptoms of jaundice, both in the complexion and the excretions. Since her visit to Tarasp, and I am writing this twelve months afterward, she has not had an attack of acute pain. Her general health is vastly improved, and her liver symptoms have almost subsided. During her attacks of colic I found nothing of the slightest service but the hypodermic injection of morphia; and the relief from this was so instantaneous, and so certain to last eight or

ten hours, that I came to rely on it alone. She is unable to obtain the Lucius water in London, and she has tried instead both Vals and Carlsbad, when there is any inclination to deficiency of bile in the fæces. Of the two the latter has much the most beneficial effect. At the same time she takes frequent warm baths in which carbonate of soda has been dissolved.—L.W.S.]

Length of Treatment.—Three to five weeks.

ENLARGEMENT OF SPLEEN.

Spring.—In those cases which depend on previous malarious affections I have seen particularly good results. Three to six glasses of Lucius water in the morning, and one or two of Bonifacius in the evening. Chalybeate bath daily.

Favourable Signs.—Improvement of the pale yellow complexion; decrease of the area of percussion dullness.

Unfavourable Signs.—The occurrence of œdema, which I have not yet seen, must cause the suspension or abandonment of the treatment.

Length of Treatment.—Three to five weeks.

BRIGHT'S DISEASE.

Spring.—I have seen in many cases the dimunition of albumen in the urine from the drinking of Bonifacius water, three or four glasses in the evening, and a chalybeate bath daily; and markedly in the case of a colleague who superintended the matter himself. Large doses of the Lucius water can here have no place.

Favourable Signs.—Diminution of the albumen and the œdema; better countenance.

Unfavourable Signs.—More œdema, and increase of fever, demand an immediate suspension of the treatment.

Length of Treatment.—Four to six weeks.

RENAL CALCULUS.

Spring.—One well marked case only has occurred to me which with certainty could be referred to the formation of a stony concretion in the pelvis of the kidney; there was at the same time a considerable excess of uric acid. The abundant sandy deposit became more sparing immediately on drinking the Lucius water, and ceased simultaneously with the excessive acidity of the urine.

Length of Treatment.—Four weeks.

Herr B., Dane, aged sixty-four, came to Tarasp with renal colic, passage of much sand, and very acid urine. He had slight gouty pains in the toes. As he had some little inclination to diarrhœa, I began the treatment with only two half glasses of Lucius water in the day and alkaline baths. The treatment was continued for four weeks, and the daily quantity of water was increased to five half glasses. In the course of the treatment, the well known kidney pains repeatedly appeared, and were followed by the passage from the bladder of a granular sand, enveloped in hyaline mucus. Larger calculi were not passed, and as they were carefully looked for they could not have been overlooked. After ten days the urine was markedly less acid, and after twenty-four days its reaction was normal, at which time all trace of sand had disappeared.

An exactly similar case presented itself to me in an old gentleman, also from Denmark, with a similar condition in relation to the urine. The treatment consisted of three to five glasses of Lucius water and alkaline baths. After fourteen days I noted a normal reaction of the urine and the disappearance of the sand. I have heard since (two years afterward) that this patient remained quite well.

I would remark that it is good for such patients to drink, in the spring or autumn of the year following the treatment at Tarasp, twelve to fifteen bottles of the Lucius water in conjunction with a suitable diet.

VESICAL CALCULUS.

Spring.—I have no experience in this disease, but the reports of others speak favourably of the action of the Lucius water in stone of the bladder.

Length of Treatment.—Not under five or six weeks.

IRRITABLE BLADDER.

Spring.—I can only speak specially of catarrh of the bladder, in which three or four glasses of Lucius water daily, along with alkaline baths, is followed by good results. In incontinence the chalybeate water would have the preference, perhaps in large doses.

Unfavourable Signs.—Increased irritation and incontinence.

Length of Treatment.—Four weeks and longer.

UTERINE DISEASES.

1.—Leucorrhœa.

Spring.—According to the cause, sometimes the chalybeate waters, (in anæmia, chlorosis, weakness,) and sometimes the alkaline waters, (in plethora,) are indicated. In many cases a combination of both springs and the use of injections of the chalybeate water are suitable.

Length of Treatment.—Three to five weeks.

2.—Hypertrophy.

Spring.—Here I refer specially to chronic infarctus of the uterus, in which three to five glasses of Lucius water daily and alkaline baths act favourably.

Unfavourable Signs.—The occurrence of profuse bleeding.

Length of Treatment.—Three to five weeks.

3.—Fibroid Tumour.

The treatment is altogether useless in fibroid.

4.—Cancer.

Treatment here could only work mischief.

AMENORRHŒA. DYSMENORRHŒA. MENORRHAGIA.

Spring.—I take these three anomalies of menstruation together for they present the same etiological and therapeutical point of view. When they originate in conditions depending on want of blood and chlorosis, the iron waters, inwardly and outwardly, are indicated. When, on the contrary, there is obstructed pelvic circulation, the alkaline waters are to be preferred. In certain cases, a combination of the two classes of waters is reasonable. The Lucius water is a decided stimulant to uterine action, and very generally hastens the appearance of the menses. In the more torpid forms, and where there is accompanying inactivity of the bowels, it is to be preferred. This is further the case when the iron waters give rise to constipation and congestion; only the dose must never be excessive, three, or at the most four, glasses daily. At the occurrence of the period, treatment must be stopped at once. General rules are not lightly to be laid down, individual cases requiring special details of treatment.

Unfavourable Signs.—Excessive loss of blood; inflammatory symptoms.

Length of Treatment.—Three or four weeks.

SKIN DISEASES.

Spring.—I have seen good results in eczema, especially where it was combined with varicosity of the lower extremities. It would seem that benefit should be expected when the foundation of the disease is to be found in some hepatic or other disorder amenable to the alkaline water. Four to six glasses of Lucius water and alkaline baths daily.

Length of Treatment.—In any case not under five or six weeks.

[I have seen four cases of chronic eczema which were treated at Tarasp. In one case the basis seemed to be a gouty disposition, and in the others the liver was at fault. In all there was immense relief, especially from the warm alkaline bath. In three the cure has been permanent; in the other the attacks have returned, in short they may be said to have been almost persistent. But in this case there has been for many years, and there still remains, a very indolent condition of liver; a condition which, as well as the consequent eczema, has been twice greatly benefitted by the alkaline waters of Tarasp.—L.W.S.]

GENERAL CONCLUSIONS.

To sum up, I would say that the forms of disease likely, nay certain, to be benefitted by the alkaline water are those which, for the most part originating in excess of food and deficiency of exercise, have for their basis faulty nutrition in the abdominal organs, and for their evidence these;—large congested liver with or without concretions in its ducts; overburdened stomach, with heartburn, and distress; loaded urine, full of urates, or depositing uric acid as a concretion within, or as a sand without, the body; irritable bronchial mucous membrane, secreting tough tenacious phlegm; unhealthy skin, exfoliating in psoriasis, or weeping in eczema; gout or rheumatism, either fully developed, or cropping up here and there in disturbed action, or perverted sensibility of some important organ. Enlargements of glandular organs of simple character, or of scrofulous or malarial origin, and irregularities of menstruation dependent on uterine congestion, are equally benefitted. In many of the latter cases the addition of the iron water is of signal service, and nowhere is a judicious combination

of the two more profitable than in cases of anæmic amenorrhœa. But a course of this alkaline purgative should not be taken by the cancerous, the epileptic, or the pregnant; and it should, if needful on other accounts, be used with the greatest caution in valvular disease of the heart, in tubercular disease, and in weakly persons. It should be discontinued if loss of appetite, flatulence, persistent diarrhœa, sleeplessness, or increasing debility, result.

As regards the iron waters, they will be of use in anæmic and enfeebled conditions generally, and in the vast number of cases of deficient nutrition, where not the blood, but the nervous supply, is the first imperfection; and where not excessive feeding, but excessive working, whether of body or of mind, is the cause of this waste of force.

But still a word about the restorative influence of the climate and the scenery. The pure, clear, bracing air, of equable warmth and moderate moisture; the bright sunshine tempered by pleasant breezes; and the high-lying situation, with its lessened earth attraction and diminished air pressure, must, nay do, have an immense curative power over the human body, racked and strained with the ever-increasing tensions and vibrations of modern life. And the influence of these more refined curative agents is not less real, not less sure, than that of those coarser materials on which we are too prone, I fear, to place our chief reliance in the treatment of disease.

But is there nothing to be said for the still more delicate influence of glorious scenery and peaceful quiet on the weary brain? Surely this is real too. It is not the mere absence of noise and worry and work, but the actual, all-pervading presence of natural beauty which brings rest and repose. Through the mind and soul of man the body is refreshed and purified, and in these quiet Alpine valleys, and among these stupendous Alpine hills, the voice of God himself is heard and seen and felt, saying in blessed tones of holy calm, "Peace be still."

CANCER SUCCESSFULLY TREATED BY THE INJECTION OF BROMINE.

By A. Wynn Williams, M.D.,

Physician to the Samaritan Free Hospital for Women and Children.

The successful efforts occasionally made by nature to remove disease from the human frame will frequently excite our surprise and admiration, and ought at all times to incite us to emulation or imitation. In the commoner forms of disease these endeavours are not only attempted, but completed with a little timely assistance from the physician or surgeon. The diseases, however, known as malignant, such as the various forms of cancer, have in the main baffled the attempts of not only the physician and surgeon, but nature herself has had to succumb under their dire and fearful ravages. The *vis medicatrix naturæ* of animal life will again and again renew the struggle to cast out, so to speak, the venomous reptile gnawing the very vitals, until at length the poor frame, in which the conflict for life is carried on, becomes so shattered and enfeebled that the combat has to be given up, though most unwillingly. Many, if not all, who read these lines have at different times witnessed the scene which I have so briefly depicted, during the growth of, and changes in, a cancerous or malignant tumour. I am not going to discuss the point as to whether or not cancer is a purely blood disease, but shall merely observe that although it may not be a blood disease in its early commencement, contiguous or even distant parts sooner or later, by means of the circulation, become tainted with the disease, and when such is the case it is like the hydra-headed monster, and to attempt to battle with it is worse than useless.

Many years ago it fell to my lot to witness, on more than one occasion, cancerous tumours undergo spontaneous death and removal by sloughing out, the cavity ultimately filling up by granulation and cicatrization, leaving the parts around to all

appearance healthy, and remaining so for several years. Indeed, in one instance, where this fortunate occurrence took place, in a very elderly lady, the disease never returned. She lived long past the period allotted to man, and died at the age of ninety-two, of what may be properly termed natural decay. In cases of cancer of the uterus, it is not so very uncommon to see nearly the whole of the mucous and muscular structures removed by this process of death and sloughing, leaving a mere shell of muscle, and the peritoneal covering. This is most graphically described by Dr. West, in his admirable work *On the Diseases of Women*. Anatomically the muscular structure of the uterus is composed of three layers, and it would seem as if the mucous lining and the two inner muscular layers were first removed during the progress of the disease, and in this way we must account for the length of time the unfortunate sufferer often exists before the final catastrophe. Having then witnessed and studied these too often abortive efforts of nature, and, at the same time, the very unsatisfactory results following the use of the knife, not only in my own practice, but also in that of others, I often pondered over this want of success. Again, having witnessed the wonderful effects of a *pure solution of iodine* in the removal of strumous deposits, and the extraordinary short period, comparatively speaking, in which caries and scrofulous ulcerations of the different textures of the body would heal when dressed with only weak solutions of iodine, I often regretted we had no drug possessing the same powers over cancer.

I well remember, although many years ago, having under my care a farmer whose whole lip, in fact the entire covering of the lower jaw, was removed by the ulceration of an epithelioma, and my applying to it a solution of bromine. I was made aware of the first good resulting from the application by my patient's daughter, who made the remark that since that strong stuff had been applied the horrible stench of the wound had been got rid of. The people of the house were in comparative comfort. The wound was dressed twice a day with a lotion composed of ten drops of bromine, a little spirit, and eight ounces of water; the result being the removal of the cancerous deposit from the more superficial parts, and the actual cicatrization of the wound to a very considerable extent. The disease, at the same time, extended its ravages below and within the mouth, the old man ultimately dying of exhaustion. What was the lesson to be derived from this? Why,

that when bromine is kept applied to certain forms of malignant ulceration, the process of decay in the cancerous deposit is hastened, and the reparative powers of nature are permitted to exert their influence; and that, to be of any ultimate benefit, it would have to be applied to the root of the evil, that is, it would be useless to apply it to the more superficial parts whilst the disease was allowed to carry on its ravages in the deeper and more vital parts. I thought over in my own mind the possibility of injecting bromine into a cancerous mass. Ill health and my removal to London, prevented the carrying out of my, as I may say, crude intention; and upon mentioning the idea to some of my professional friends, I did not receive much encouragement to put it in practice. Then there was the difficulty of procuring a suitable case. Nevertheless, I did try it in one or two cases of cancer of the mamma, which had been pronounced too far advanced for surgical interference, the results being somewhat unsatisfactory. In some the solution injected was too weak. Finding, however, that I did my patients no harm, and that they were not poisoned by the absorption of the bromine into the system, I became more courageous, and injected stronger solutions; until at length I found that bromine might be injected with impunity of such a strength as would cause the death and softening of the tumour, and, indeed, of the other textures with which it came in contact, but acting more powerfully, as might *à priori* have been presumed, on the diseased or abnormal structures.

These lines were written some time before meeting with the following paragraph from the pen of the late Sir James Y. Simpson. "If you use a caustic you can remove as much of the mass as can be done with the knife, but you have, in addition, the probability of the substance becoming absorbed and infiltrated with the tissues around, and poisoning or modifying the character of any cells which may have a tendency to take on the cancerous type of development. That such absorption does occur is proved by the fatal result ensuing in some of the cases where arsenic has been employed as an ingredient in the escharotic, and in the distressingly painful effects of some less fatal agents. Such being the case, if we could only discover some agent which would first destroy the great mass of the disease, and then, becoming absorbed into the surrounding texture, would there destroy altogether those cells which have taken on a perverted type of development, or modify in some degree their vitality, then we might hope, by the use of such a caustic, not

only to remove the disease more effectually at the time, but afford more security against the chances of its return."

To say that bromine fulfils these requirements may be set down to egotism, but that it does so when employed in suitable cases, no one will venture to deny, after giving it a fair trial. Unlike its kindred substance iodine, it does not appear to be absorbed into the system. Its action is local, although there can be no doubt that on becoming gaseous it permeates the surrounding tissues beyond the point where it acts as a caustic. That it modifies the ulcerated surface of malignant tumours is beyond the shadow of a doubt. Our object then is to get this volatile semi-gaseous caustic applied to the base of the tumour—that is, to commence the destruction of the tumour at its junction with the healthy tissues—and the only means of doing this is by injection. It has been attempted by others to destroy these tumours by various injections, but hitherto with little or no success. Bromine also has been employed in combination with other ingredients as an escharotic by Landolfi, but I have never heard of anyone injecting a simple spirituous solution of bromine into a malignant or non-malignant tumour until after I had done so again and again, and had proved beyond doubt its harmlessness, excepting only so far as regards its escharotic action. In its manipulation the greatest care is required.

It is almost needless to observe that the earlier you can bring your patient under treatment the more likely you are to succeed. How is it, I would ask, that patients will go on suffering from tumours in the breast for months, nay years, without calling the attention of their medical men to their state? The dread of the knife and the uncertainty of permanent benefit. It is in great measure owing to this delay that no lasting benefit is derived. Patients come and seek advice after having suffered the tumour to remain unmolested so long that the contiguous parts have become implicated, more especially the skin and the glands, and when such is the case, your patient's state is very little advanced, even though you may succeed in removing the tumour, as secondary growths are, under such circumstances, and with our present knowledge, certain to recur. Would this be the case if our patients knew that the tumour could be destroyed as certainly without the knife as with it, that there need not be the loss of a single drop of blood, and that the chances of erysipelas, &c., are nil? We may, I think, safely presume that such would not be the case, but that they would seek relief at once without fear or dread,

and that their chances of recovery would be multiplied an hundred-fold. Supposing that the diagnosis as to the true character of the tumour were not correct, and that a non-malignant tumour should be submitted to this mode of treatment, I can only say that I know of no better way of treating it, as every tumour ought to be, and must be, got rid of. Of course, I do not speak of those sympathetic tumours dependent on disease of the uterine organs, as on the cure of the latter ailment the swelling in the mammæ disappears.

Amongst others I mentioned the good results to be derived by the use of bromine to my friend, Dr. Routh, now my colleague at the Samaritan Hospital, who forthwith proceeded to test its efficacy by applying it to cancerous affections of the uterus, and was so well pleased with the results produced that he read a paper on the subject before the fellows of the Obstetrical Society, which was published in the eighth volume of *The Transactions*. In the commencement of the paper he states that the use of bromine as a local agent was first suggested to him by his colleague, Dr. Wynn Williams. In the year 1868, being fully convinced of the efficacy of the treatment in cancer of the uterus, I published a small pamphlet on the subject, wherein I gave full particulars as to the manner of using this most powerful agent, not only by its external application, but also by its injection into the deeper and more solid parts. I at the same time mentioned in a foot-note the fact, of which I had only lately become acquainted, that Landolfi had employed bromine in combination with other ingredients as a pomade to malignant growths. Subsequently, Dr. Routh read a paper on the same subject before the members of the British Medical Association, and published it in *The British Medical Journal*, wherein he relates some very interesting cases treated by the application of bromine, and mentions the fact of my having injected it into cancerous tumours of the uterus, stating at the same time that he himself had no experience of this mode of using the remedy. Now, I contend that the non-injection of the tumours is simply like acting the play of Hamlet, with the part of Hamlet left out.

In 1870 I read a paper on cases of cancer of the womb successfully treated by bromine, before the fellows of the Obstetrical Society, in which I endeavoured to point out the great benefit to be derived from injecting cancerous tumours of the womb with a strong solution of bromine, together with a history of eight cases treated by injection and application, accompanied with drawings, and published in the twelfth volume of *The Transactions*. I may

here observe that all the patients whose cases are therein related are, as far as I have been able to ascertain, alive and well. The difficulty I have had to contend with in convincing my medical brethren of the efficacy of the bromine treatment has been their scepticism, their doubts as to whether the cases related were or were not cases of malignant disease. Some even going so far as to say that they could not have been cases of cancer of the uterus, because the organ was found to be movable. To these gentlemen I have only to remark, that cancerous deposits in the uterus, as in other parts, must have a beginning, and that, in a few instances, a considerable portion of the neck and body of the uterus has been removed by disintegration and ulceration, whilst the remaining portion of the organ has been found to be perfectly movable. For confirmation I have only to refer them to Dr. West's or Dr. Churchill's works *On Diseases of Women*. In two of the cases I would observe that the diagnosis of malignancy did not depend on myself. In the one case the neck of the uterus had been, previously to my seeing the case, amputated by one gentleman. The disease returning, it was attempted to be removed by the actual cautery by another gentleman, but without success. I was called to see the other case by my friend, Dr. Murray, who had himself unsuccessfully amputated the neck of the uterus.

I will now, as briefly as I can, describe the mode of treatment adapted to the different forms and stages of malignant diseases of the uterus and other parts. In the first place we shall require a spirituous solution of bromine; the strength, one drachm of the latter to three drachms of the former, or one to three. This is much stronger than I formerly used it. The solution should always be mixed before visiting our patient, so as to have as little odour in the room as possible, and to prevent any untoward accident from the sudden increase of temperature when the two liquids are mixed together. For the more conveniently carrying it about I have a half pint wide-mouthed stoppered bottle filled with water, in which I place the smaller bottle containing the solution of bromine. We shall want a properly constructed glass syringe with platinum point, or a trocar and canula, the canula made of platinum; and, for uterine cases, a long handle with a shoulder attached to it, into which a glass syringe accurately fits. I find the trocar is much more easily forced into the more solid growths than is the point of the syringe. These instruments have been made for me by Mr. Pratt, and Messrs. Krohne and Sesemann.

We shall require a saturated solution of carbonate of soda, cotton wool, a pair of long forceps, a long thin stick, and a small cup made of vulcanite or any other material, some gutta percha tissue, and a large size speculum. These, then, are our armamentarium, and for external tumours, gutta percha or other rings of various sizes that may be readily bent into any shape.

We will suppose a patient with a suspicious tumour in one or other, or it may be one in either, lip of the os uteri. Every means that we know of has been employed for its dispersion without avail. We have satisfied ourselves in fact that it is malignant, probably medullary carcinoma. The uterus of course being movable, having lubricated the speculum, we insert it carefully into the vagina, over the enlarged os and cervix, then withdraw it a few lines and pass up a small piece of cotton wool well saturated with the solution of soda, place it nicely into the posterior cul de sac of the vagina, under the neck of the uterus, press up the speculum, and we have the perineum protected from injury. We now charge the glass syringe, pass the trocar up the speculum, and force it into the tumour to the desired depth; then surround the canula with cotton wool wetted with the solution of soda, withdraw the stilette, insert the ground point of the syringe into the shoulder of the canula, and force in as much of the strong bromine solution as we may think necessary, say from five to ten minims; wait a few seconds, then withdraw the canula and syringe, and lastly, we remove the cotton wool and the speculum. The syringe, with the platinum point, may be used if preferred. We order the vagina to be washed out with a bromine lotion during the whole subsequent treatment, of the strength of twenty minims of bromine, first mixed with half an ounce of spirit and then added to twenty ounces of water. This, we consider, is a very essential part of the treatment, as the wound looks more healthy with its use, and granulates more freely.

In cases of epithelioma we must proceed somewhat differently. If there is a mass of cauliflower excrescence we must remove it with the wire *écraseur* before proceeding to inject the stump. If it is of the more flattened character, with overhanging edges, we must first destroy its outer surface by applying cotton wool saturated with the bromine solution, by means of the vulcanite cup, for an hour or more, always taking care to protect the vagina by packings of cotton wool wetted with the solution of soda. If the epithelioma is situated on the side of the neck, we must cover the wool and

bromine solution with gutta percha tissue, keeping it *in situ* by placing over it a pledget of cotton wool. When we have succeeded in removing all external growth we proceed to inject any hard portion or stump that may be left. In those cases, again, where the cancerous growth, whatever its nature, is in a state of ulceration, we must first destroy the rugged ulcerated edges by applying the bromine solution with cotton wool, &c. If we feel satisfied that the disease is confined to the uterus, the surrounding textures not being implicated, we must proceed by injection, as in other cases. In all cases where the slough caused by the injection has separated, we must satisfy ourselves that we have got fairly behind the disease; if not, we must proceed to inject again and again, or we may fill the cavity with cotton wool wetted with the strong solution, covering it over with gutta percha tissue, or we may apply the solution by means of the vulcanite cup, through which there is a hole for the purpose of inserting a stick; round the protruding portion of the stick we roll cotton wool, then saturate with the bromine solution and insert into the cavity; we must not, in fact, allow the wound to granulate up until we feel convinced that no cancerous deposit remains.

In cases of cancer of the breast and other external parts we do not meet with the same difficulties as when the uterus is the part affected. No doubt our ingenuity will be taxed again and again, but with the addition of the rings already mentioned our armamentarium need not be greatly increased. In the loose tissues about the mammæ the solution, when injected, unless confined within certain limits, will sometimes run riot. To confine it to the part we wish to inject, a ring of a suitable size is bent to the shape of the tumour, and pressed firmly down over it by the assistant before introducing the syringe and injection. This effectually confines the solution to the space within the ring. The device used for confining the solution within due limits in epithelioma of the lip will be mentioned in the case referred to.

The following case of cancer of the uterus was in a far more advanced stage than any I have previously published. I might relate others, but one will suffice. I must here state that the progress of this and other cases has been watched with much interest by several medical practitioners, both English and Foreign, all of whom have expressed themselves fully satisfied with the successful results; one gentleman remarking that it had quite revolutionized all our previous ideas of cancer of the womb. Mrs. S., aged 47, tall, thin,

cachectic looking, the mother of two children, presented herself at the Samaritan Hospital, January 1st, 1870. She had been suffering from the ordinary symptoms of uterine ailments for some two years, such as pain in the loins running down the thighs and in the splenic region, profuse menstruation, and, latterly, more or less hæmorrhage, with a profuse offensive discharge. On making an examination with the finger, the uterus was found to be heavy and swollen, with great increase of temperature. The os felt hard and ragged. The whole organ was movable, but not freely so. Through the speculum, the os was seen to be enlarged, and the mucous membrane surrounding it broken up into shreds, blood and sanious matter of a very offensive character oozing out when the speculum was pressed upon it. The mucous membrane, with the exception of that surrounding the os and anterior portion of the cervix, was apparently healthy. I had no hesitation in pronouncing the case to be one of medullary carcinoma in a state of disintegration. As the uterus was tolerably movable, and the surrounding parts free from disease, I at once applied to the outer and ragged surface the solution of bromine, using the vulcanite cup, &c. She was ordered a mixture containing the tincture of perchloride of iron and nux vomica, nutritious diet, and to wash out the vagina thrice daily with the bromine lotion.

January 8th.—Much of the ragged edges removed; bromine again applied. The same treatment was continued for a month, during which time she had a great loss at the menstrual period.

January 29th.—A considerable depression now existed in the anterior part of the neck, the edges of which were surrounded by tolerably healthy granulations; but a hard mass could be felt and seen in the bottom of the wound. This I injected in the usual way. She was ordered half a grain of morphia each night if in pain, to continue the other remedies, and attend again in a fortnight.

February 12th.—Slough had separated, leaving a cavity more than half an inch deep, at the bottom of which some unduly hard portion was felt, bleeding readily when touched. Cotton wool saturated with bromine solution was carefully placed within the cavity, covered with gutta percha tissue, and kept applied for nearly half an hour.

February 19th.—Same treatment carried out.

February 26th.—Was suffering from so much hæmorrhage she could not attend; ordered to inject into the vagina, three or four

times a day, a lotion containing two drachms of perchloride of iron to twenty ounces of distilled water.

March 5th.—Hæmorrhage soon ceased after using the iron lotion. The wound looked flabby, and at the bottom could still be felt a hard mass. This I again injected.

March 19th.—Slough had completely separated, leaving a very ugly looking cavity one inch in depth, but the hard lump was no longer to be felt. The cavity was slightly touched with the bromine solution.

March 26th.—Everything looking healthy.

From this date the wound was allowed to granulate, the patient taking quinine and cod liver oil. By the middle of April the wound had completely healed. The patient had not suffered from any further hæmorrhage. Indeed, menstruation ceased from this time. I saw the patient a few weeks ago, looking the picture of health.

This mode of treating well-selected cases of cancerous deposits in other parts of the body we have found to be equally as efficacious as when the uterus is the seat of the disease. We do not hesitate to inject any reasonable sized growth when situated in an accessible part. Indeed, the more readily are the parts reached, the more satisfactory are the results. I will detail two cases in point.

A patient was sent to me by my friend and colleague, Dr. Savage, who at the time made some such remark, that "if I succeeded in curing such a case it must put an end to all cavilling." J. B., aged 54, a strong powerful looking man, visited me October 12th, 1870. He informed me that he had noticed a swelling in his lower lip fully two years before November 1869; that at that date he went to Guy's Hospital and had the tumour removed by Mr. Cooper Foster, and that soon after leaving the hospital he noticed a return of the disease in the cicatrix, which had gone on increasing ever since. Very nearly the whole of the lower lip had been removed by the usual V shaped incision. In the upper and central part of the cicatrix there existed an epithelial deposit in a state of ulceration, in circumference about the size of a shilling. The glands beneath the jaw were not enlarged. He informed me that he had been examined by several surgeons since the return of the disease, but that none of them had proposed any further operative interference. I at once proceeded to inject the tumour with bromine, using the syringe, having first protected his mouth and nostrils with pledgets of lint wetted with the solution of soda.

Visited me again on the 19th and 27th, could see no difference in the state of tho tumour. I now injected the tumour with a solution of bromine containing twenty minims of bromine to sixty of spirit. The pain produced by this injection was very considerable. Cotton wool and oiled silk was strapped over the injected part.

November 4th.—The injection had had the desired effect. The greater part of the tumour was gangrenous and smelling horribly. To destroy the smell he was ordered to apply a lotion containing a small quantity of bromine and iodine.

November 10th.—Slough had now separated. The disease on the right and centre of the cicatrix was removed, but there was a portion remaining on the left. I isolated the remaining portion by grasping the lip with a pair of screw forceps, such as are used for removing tumours from the eyelid; the flat blade being placed within the lip. On screwing the blades together the part I wished to inject was forced through the open blade, and thus easily injected without encroaching unnecessarily on the healthy structures. When this slough separated there was left a clean-looking excavation, the skin and mucous membrane being as it were hollowed, with a considerable flap of skin hanging down. A silver suture was passed through the skin and mucous membrane to prevent disfigurement. These united and the wound filled up rapidly, leaving my patient with quite as good a lip so far as appearance went, as before the injection, and his lip was now movable, which it was not before. He told me with great glee that he could now whistle. He was exhibited before two of the societies in London. Up to the present date there has been no return.

E. S., aged 33, single, camo to the Samaritan Hospital, August 19th, 1871, and was seen in my absence by my colleague, Dr. Bantock, who diagnosed "tumour in the mamma," and recommended the patient to wait my return, which she did, and as she was not in very good general health she was ordered cod liver oil and quinine, and allowed to go into the country for a month. She returned to the out department of the hospital September 6th, with health improved. She informed me that she first noticed the tumour three years ago, that she had not suffered much pain until the last six months, when it became very severe. On examination a tumour the size of a small hen's egg was found occupying the lower and outer part of the right mamma, imbedded deep in its substance, of unmistakably scirrhous hardness. I may here state that Dr. Bantock was of the same opinion. I at once, after placing my

patient under chloroform, proceeded to inject the strong solution of bromine. In three weeks the greater part of the tumour had been thrown off, but there was a deeper prolongation of the tumour which had not been reached on the first occasion. She was again put under chloroform, and this part injected. In another three weeks the part last injected separated, and as I had some little doubt as to the healthy character of the parts at the bottom of the wound, I on two subsequent occasions placed cotton wool wetted with the bromine solution into it. This sufficed to satisfy me, and others who saw the case, that there was no disease left. The wound rapidly filled up and granulated over under the use of the bromine lotion. She was kept under notice until December, when she ceased to attend. I sent for her the 1st of July this present year, (1872), and found her in perfect health, with a slight scar like that of a burn over the site of the tumour. I must here observe that the patient was treated as an out-patient, was not compelled to lie up, and, as she states, slept well the whole time she was under treatment.

THERAPEUTIC MEMORANDA.

(SECOND SERIES.)

By W. Bathurst Woodman, M.D.,
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and Physician to the North Eastern Hospital for Children.

HYDRATE OF CHLORAL.

In last year's Transactions, I put on record some cases of failure in the treatment of hooping cough by this drug. My friend and colleague, Dr. Sansom, was kind enough to direct my attention to some striking instances of successful treatment of the disease by the chloral hydrate; I was therefore induced to make some further trials of it, which lead to the conclusion that if a proper selection of cases be made, it is a very valuable aid to treatment. The cases which appear suitable are those in which there is a great amount of irritation and spasm present; not of course those in which bronchitis or broncho-pneumonia, with extreme congestion of the lungs, are the chief features; nor yet those in the very advanced stage, when tonic and astringent remedies, with change of air, or at least a very great deal of fresh air, are, and perhaps always will be, our best and most reliable therapeutic aids. But we are all familiar with cases in which the constantly recurring spasm of the glottis, hindering free aëration of the blood and threatening suffocation, is accompanied with such irritation of all the branches of the pneumogastric nerve, and such constantly recurring paroxysms of coughing and vomiting, followed by general convulsions, or threatenings of such, that anything like healthy sleep, healthy digestion, or in fact the due performance of any of the vital functions, becomes impossible. In these cases, we have, I believe, a very valuable means of *gaining time*, and subduing the spasm, in hydrate of chloral. But to do this, it must be given in sufficient doses, and it must *be carefully watched.* Nor must we omit a careful dieting, and all those hygienic remedies, which are most especially needed in such diseases as the one we are dis-

cussing; of the true pathology and ætiology of which I presume it will be conceded we are still ignorant, although we recognise its potency by the effects, and know exactly where and how it spends its force.

There are two methods of exhibiting the hydrate of chloral for this purpose. One, which is strongly recommended by Dr. Sansom, consists in exhibiting a full dose of the drug in the evening, so as to secure a good night's rest, and in the day time either giving no medicines, or giving other remedies. This is, I feel sure, the best in private practice, or in hospital wards, or institutions where this malady breaks out; in short, wherever we can superintend closely the effects of the drug, seeing the little patients once or more daily. The other, which is better adapted to hospital out-patient practice, or where the cases are seen less often, consists in the frequent exhibition of a more moderate dose, and, if needs be, increasing it, giving the mother or nurse careful instructions as to watching the effects of the remedy, and directing its being withheld for a time as soon as spasm is relieved, and on the first approach to narcotism. As long as the hydrate of chloral is doing good, it will I think be found that the little patients not only sleep better, but *feed better*.

It will perhaps be best to append a couple only of illustrative cases, although I could give a score. They are interesting also, as showing its effect upon the skin, or, to speak more accurately, upon the vaso-motor nerves, producing a rash like measles.

Case I.—Hydrate of chloral given for eleven days, to the amount of 440 *grains. Great relief of the severe symptoms of hooping cough. Measly rash on the eleventh day.*

Mary E., a stout little girl, aged six years, was brought to me at the London Hospital on the 12th of January, 1872, suffering most severely from paroxysms of hooping cough and dyspnœa. She was of the xantho-tubercular type, and had been attacked about three weeks; had hooped for one week. Sleep was almost impossible, she was constantly sick, refused food, and was losing flesh rapidly. The paroxysms were almost incessant. I ordered her ten-grain doses four times in the twenty-four hours, and the effect was almost magical. She continued the hydrate for eleven days, at the end of which she was practically cured; but the mother came to me, and asserted that she had measles. The child's heavy eyes appeared to corroborate her statement, but finding that although the rash bore a striking resemblance to measles, it had appeared on

all parts of the body simultaneously, and that *her temperature was subnormal*, although there were no signs of collapse, I confidently predicted that the rash would disappear almost as suddenly as it came, if the medicine was left off. The drug was discontinued, and next day the rash was gone. No further medication was needed, except a steel tonic, and there were no other toxic symptoms.

Case II.—Severe hooping cough. Hydrate of chloral given for seventeen days, to the amount of 340 *grains. Complete cure. Production of measly rash as in the former case.*

Eliza B., a delicate, ricketty child of fair tubercular diathesis, had suffered severely from hooping cough for a month before being brought to me. She had hooped for about fourteen days. The paroxysms were as severe as in the last case, but I gave only half the dose, on account of her feeble development. Five grains of the chloral hydrate were taken by her, four times a day, for seventeen days, at the end of which the cough was gone, although there was occasional vomiting and dyspnœa, with some symptoms of gastric catarrh. On the seventeenth day, when 340 grains had been thus taken, a similar rash to that of the former case appeared, and *on leaving off the chloral, disappeared as quickly.* There were no further injurious effects, and steel wine and cod-liver oil soon restored her to good health.

I have met with a few more cases of purpura and glycosuria, after a somewhat prolonged use of this remedy for other diseases, but as these are no longer novel, I forbear to quote them at length.

PLUMBI ACETAS (SUGAR OF LEAD).

Without venturing to affirm that there is absolute proof of the efficacy of this salt in internal hæmorrhages, especially in hæmoptysis, I must say that the clinical evidence in its favour (in combination with opium, as in the time-honoured Pilula plumbi c opio) is very strong indeed. It is not bulky, and as a rule there are no bad effects whatever. The following cases will show, however, that in some patients the lead-line on the gums is very readily produced.

Case III.—Hæmoptysis. Lead-line on gums after taking twenty-one grains of sugar of lead.

Jane E., aged twenty-five, suffering from phthisis, was attacked with severe hæmoptysis. Ice and absolute rest having failed, I gave the lead and opium, in the form of pills, with one grain

of the lead-salt, and one-sixth of a grain of opium, every two hours. After taking twenty-one grains, the hæmorrhage ceased suddenly, and the patient complained of slight colic. There was now a very well-marked lead-line on both the upper and lower gums, which I showed to several students. There had been none previously. I could trace no other source.

Case IV.—Lead-line after forty-two grains were taken.

The pills were ordered here to favour coagulation of blood in the sac of an aneurism of the aorta, in a *male*, aged forty-nine. The whole quantity was taken in two-grain doses, every four hours, (and therefore in three and a half days, the medicine being continued at night.) There was no colic.

P.S.—I may add here that I have met with *several* cases in which from forty to fifty grains have produced a well-marked line.

Case V.—Lead-line after only eighteen grains of the acetate had been taken.

A young girl, who had dysenteric diarrhœa, took eighteen of the pills above named, one pill three times a day, consequently the medicine was continued for a week. The lead-line was so strongly marked at the end of the six days, that I suspected some other source of lead-poisoning, but utterly failed in finding any. I had the remaining six pills of the two dozen originally given her, brought back, and examined them to see if the lead was in its right proportion, and the result was that they appeared to have been made with extreme accuracy. To the best of my belief this is the smallest recorded quantity of this salt sufficing to produce the lead-line.

ZINCI SULPHAS.

A long experience of this as an emetic has satisfied me fully, that, for almost all cases in which an emetic is useful, this is the best to choose. If only freely diluted, it is quite safe up to two-drachm doses, although half a drachm to one drachm is usually ample, and less usually suffices for children. But I do not think it is generally known that this is of all modes the most rapid known of relieving, if not curing, acute urticaria depending on gastric irritation, from various kinds of food and drink, or from exposure to heat or sudden chills. I got the hint from an old woman who gave a lad a lot of *hot* nettle tea, for the same end, and with great success. As however her method involved the getting of nettle tops, and the imbibition of several pints of the nauseous decoction or infusion, I determined to

try the sulphate of zinc instead, in a drachm dose, diluted with about half a pint of water.

Case VI illustrates its power.

A young medical man whom I had known as a student, came to me, saying he wanted to go to a ball the same evening, but feared he could not, as acute general urticaria (ascribed by him to a little imprudence in diet) would he felt sure utterly prevent his going, unless he could get relief. His symptoms had come on slightly the night before, but in a bearable form; now they were agonizing. I explained my method, and gave him the dose. He was instantly relieved, went to the ball, danced all the evening, taking ices and champagne, and had only a very slight and bearable relapse (which soon subsided) just at the close of the entertainment.

GLYCERINE OF TANNIN. (B.P.)

I have found this preparation to be the best external application in the whole materia medica for acute eczema, and for all abrasions and excoriations of both skin and mucous membranes. It is far superior to borax for stomaceæ, thrush, and other sores about the mouth, as well as for similar affections of the genital organs in both children and adults. My friend, Dr. England, now of Winchester, but then at Torquay, also showed me that it was of great service in many cases of conjunctivitis. I also use it in mild cases of erysipelas, with the best results.

CARBOLIZED OIL.

In cases of noma pudendi, and other phagædenic and gangrenous affections of the pudenda and other parts, such as not unfrequently attack young infants and children, during or after the acute exanthemata, this preparation, either one in forty, or in some cases one in twenty, or even stronger, is of great service, combined with the constant immersion of the parts, and sometimes of the patient (all but the head), in tepid water. We have saved several children by these means at the North Eastern Children's Hospital. I was induced to try this plan from witnessing its success in the hands of Mr. Jonathan Hutchinson. Some of the cases were distinctly diphtheritic.

CHLORATE OF POTASH.

ARSENICAL POISONING.

Mr. Hutchinson long ago pointed out that this salt was entitled to rank as a specific in cases of stomatitis with ulceration of a

multiple character. This has been so abundantly confirmed by many observers, that I only wish to add here, that in my hands it has been equally useful in the treatment of the sores about the mouth and other mucous membranes, produced by arsenical wall-papers, and other sources of poisoning by "Scheele's Green" (arsenite of copper). Such cases occur at a Children's Hospital pretty frequently, from artificial flowers, toys, sweets, paper, and dress-stuffs coloured with this pigment. I have seen a few also in the children of furriers and naturalists who stuff birds and beasts. When there is much diarrhœa, or profound constitutional disturbance, I prefer to combine small doses of opium with the chlorate of potash, generally using the tincture, for convenience and certainty in the division of doses.

FRIAR'S BALSAM. (TINCT. BENZOËS COMP.)

TREATMENT OF BED SORES.

I wish to revive an old-fashioned method of treating bed-sores, which has met with great success in my hands, in some of the very worst cases; even where large portions of bone have been exposed, and the sores have been both large and numerous, and the reparative power feeble. It consists in the very free application of the tincture above-named, but it has been suggested to me that some explanation of the best mode of using it would be of service. The plan I have adopted is as follows:—The patient being turned in such a way as fully to expose the sores, they are cleansed by pouring warm water over them; if preferred, a little Condy's fluid or carbolic acid may be added, but I have not found this essential. The sore is then freely closed with the Friar's Balsam, so as almost to fill it up with that liquid, certainly so as to cover every portion of it, including the edges. A large piece of *sheet* cotton wool (*which has not been pulled about at all*) is then laid over it, and, if necessary, a second piece over that. This dressing is then left until it becomes loose from the discharges, or offensive, (the balsam is however a great deodorizer,) and the process is then repeated. The first, and occasionally the second, application *sometimes* gives considerable pain, but this soon subsides, and the treatment is, all in all, the most comfortable I know of for this class of case. It will of course be necessary from time to time to remove sloughs, but I believe this to be best done by only removing the portions which are quite dead, and this is therefore a painless proceeding. But I must insist strongly that *the treatment of bad cases, to be successful,*

must have personal attention, and although the dressing may suffice for several days, there must be a daily inspection of that.

BLOOD-LETTING.

Sir Thomas Watson, Dr. B. W. Richardson, Dr. H. G. Sutton, and other English physicians have lately written on this subject, and given instances of the good resulting from venesection when the venous system is gorged, and in some cases of blood-poisoning (uræmic coma). I will therefore only give two or three crucial instances of blood-letting proving beneficial.

Case VII.—Suspended animation from drowning. Failure of artificial respiration alone. Success after blood-letting.

A stout lad, having taken some liquor and being tired, lay down to sleep on some steps leading to the river at Wapping, when the tide was low; he was so firm asleep that when the tide came up, it rose above him, and flowed into his open mouth, as was proved by the matter found in the vomit and sputa afterward. How long he was more or less submerged is not known, but he was brought by the police to the Limehouse District Cholera Hospital apparently dead. For three hours, the late Dr. Heckford, Dr. Walker, myself, and Mr. Elsom, kept up artificial respiration, with only partial success, for if we left off only for a minute or two, he ceased to breathe, the pulse stopped, and his lividity was horrible to witness. Under these circumstances, Dr. Heckford asked me if I would like him to be bled. I assented, and nearly a pint of blood was drawn at once from his arm. The effect was almost magical. We were able to discontinue the artificial respiration, as he now breathed by himself, and he made a good recovery, except for a somewhat smart attack of pneumonia, apparently caused by the foreign matters taken into the lungs with the dirty water.

Case VIII.—Uræmic coma. Apparent death. Bleeding. Complete recovery of consciousness, and life prolonged for twenty-four hours.

A painter, aged thirty-nine, living at Torquay, who had long suffered from Bright's disease, without much dropsy, was seized with convulsions, monotonous delirium, and urinous smell of breath, after a few hours becoming completely comatose; and when I saw him, there were tracheal rattles, and every indication of death. After a while, for he soon ceased to breathe, I bled him to rather more than eight ounces. He sat up in bed, spoke to his family and friends, and was able to take food. He then told his wife of a sum of money in the Savings' Bank of which she did not know, and arranged

other affairs, as to his children, &c. About twenty-four hours after he had another attack of convulsions, but his brother forbade a repetition of the bleeding, and he died.

Case IX.—A similar case, with recovery.

A woman, aged forty-five, similarly affected, only with great anasarca, was bled to twelve ounces by me, in 1867, and is alive now, and in fair health, although of course her damaged kidneys remain to her.

Cases X & XI.—Puerperal convulsions. Bleeding. Recovery.

I could mention some sixteen or eighteen cases in which I saw this treatment adopted by the late Dr. Ramsbotham with complete success, but I will note only two, in which I myself used it. One was a stout primipara, aged nineteen, and the convulsions were I believe, uræmic, and did not cease with the birth of the child. Bleeding to twenty ounces: recovery. The other a pluripara, aged forty-two, convulsions also of renal origin, I believe. Bleeding to sixteen ounces: recovery.

ON CROUP AND DIPHTHERIA.

By Robert Hunter Semple, M.D., M.R.C.P. Lond.,
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The word "Croup," as applied in a medical sense, is very vague, but is employed by the public to express any kind of cough attended with stridulous inspiration. It is not to be found in Johnson's Dictionary as indicating a form of disease, and the only information we have as to its etymology is that it was employed as a provincial term, in the last century, in some parts of Scotland, to indicate the cough just referred to. It was adopted, however, by some Scotch physicians as a medical term, and the disease it represented was first distinctly described, as will be presently shown, by Dr. Francis Home, of Edinburgh. Since his time the word has become acclimatized in our language, and has been used also on the Continent and in America; and the French writers, in particular, have adopted it as being synonymous with that form of Diphtheria which attacks the larynx and trachea. This view, after much consideration, I have been induced also to adopt, and the reasons for my doing so I shall endeavour to develope in the present paper.

The word Croup really means nothing, and conveys no definite idea to the mind, but the word *Diphthérite*, or Diphtheria, being derived from the Greek Διφθερα, a skin, at once presents an image which may be seized by the understanding. The difference in the terminations, *diphthérite* and diphtheria, is caused by the doubt as to the inflammatory or non-inflammatory nature of the affection, and as the preponderance of evidence shows that the disease is not really inflammatory, the latter name is now almost universally employed in this country.

In the early half of the present century the word Croup was used, by British medical writers, to indicate what I consider to be several different diseases: namely, one which is purely spasmodic, another

which is characterized by the presence of a false membrane, and a third which is distinctly inflammatory, but which presents no false membrane. While this confused notion of what was called croup prevailed in this country, the throat affections of a similar nature occurring in some parts of France attracted the attention of French practitioners, and were at first either confounded with one another or were made the subject of false pathological analogies. But in process of time Bretonneau and his followers discovered that his *diphthérite* of the trachea was the croup of Francis Home, and the claim of *diphthérite* to the title of a new disease was disavowed.

I have a full recollection of the impression made upon the medical profession in this country by the news of the arrival of a throat epidemic in 1857, and I can assert that the general feeling at first was one of disbelief in the existence of any such disease as that which was described. While admitting that several persons had died of some throat affection in a very rapid manner, most practitioners regarded the disease as nothing more than either an exaggerated form of sore-throat, or a peculiar and abnormal development of scarlatina. It was not considered as croup, for croup was said to be a disease of infancy and childhood, whereas the disease in question attacked all ages indiscriminately.

But the French practitioners at once recognized the unwelcome visitor as the disease which had often been observed in various parts of France, and had been especially described by Bretonneau, under the name of *Diphthérite*. The history of the malady, however, did not extend, even in France, to a very remote antiquity, for the first recorded epidemic occurred at Tours, from the years 1818 to 1821, and Bretonneau's first memoirs on the subject were published in the year 1826. The pupils and friends of Bretonneau, among whom was Trousseau, and a few English physicians, including the late Dr. Conolly, who happened to visit Tours at the time of the epidemic, were well acquainted with its features; and a few systematic writers on the Practice of Medicine in England, among whom was the late Dr. Copland, were also well acquainted with the literature of the subject, although none of them described the disease as a special malady. Dr. Copland, in fact, does not describe *diphthérite* under a separate heading, but all his information upon its features as defined by Bretonneau is included in his article on Croup.

Now this article, "Croup," in Dr. Copland's Dictionary, most

clearly and indisputably describes two different diseases, which, although they are both very often fatal, and both affect the larynx, have no pathological relation to one another. One of these diseases is the affection now known as laryngismus stridulus, and which, in point of fact, is not a special disease at all, but a spasmodic malady due to causes remote from the actual structures involved, and affording an instance of reflex nervous action. That Dr. Copland really included this affection under the head of "Croup," there can be no doubt whatever, for he defines it as "croup with predominance of spasmodic and nervous symptoms," and he gives as its synonyms "the larygismus stridulus of Good; the spasmodic croup of Wichmann, Michaelis, Double, &c.; and the acute asthma of infants of Simpson and Miller;" and he goes on to describe it as a purely nervous affection, unattended with any marked premonitory symptoms or with fever.

It is clear, therefore, that laryngismus stridulus, although it is sometimes called popularly *false croup*, has no relationship whatever with croup, in which there is evidence of distinct structural changes. But having thus eliminated laryngismus stridulus from croup, I contend that Dr. Copland and other writers have confounded two other diseases under the same head as croup, namely, *tracheal diphtheria*, and *laryngitis stridulosa*. Tracheal diphtheria, as at present known to medical practitioners, is distinctly and characteristically marked by the exudation of a false membrane upon the larynx and the trachea; laryngitis stridulosa is distinguished from tracheal diphtheria by the absence of false membrane. Tracheal diphtheria is a disease in which the symptoms of inflammation are, to say the least, very obscure; laryngitis stridulosa is a distinctly inflammatory affection.

I am fully aware that many modern English writers on medicine consider croup and tracheal diphtheria as distinct diseases, and yet there is not one of them, so far as I know, who, in describing the pathology of the one, does not, while denying the identity, include in it the pathology of the other. Dr. Copland, for instance, in his very able article on Croup, in the Dictionary, says, under the head "Pathology of Croup," that in the complicated cases, and in those of an apparently epidemic and infectious nature, the throat is equally affected, constituting the *diphthérite*, or the *inflammation pelliculaire* of M. Bretonneau; and in the bibliography and references at the end of the article he adduces the writings of Bretonneau, Trousseau, Guersant, and Bricheteau,

as authorities on croup, although every one of those authors regards croup only as a form of *diphthérite.*

The French writers are, in fact, and long have been, almost unanimous in considering that croup, as distinguished by British authors, is a form of diphtheria, and, according to them, "croup" is synonymous with tracheal and laryngeal diphtheria.

I think it is necessary, in the first place, to determine, if possible, what is meant by Croup, as the term is used by British authors.

The first account of croup in the English language occurs in a letter written by Dr. Blair, of Cupar Angus, to Dr. Mead, of London, in 1713; but a distinct description of the disease is contained in *An Inquiry into the Nature, Cause, and Cure of Croup*, by Dr. Francis Home, published in Edinburgh in 1765. This treatise is a small one, but it contains a great amount of valuable information on the malady in question. The author, while wondering that the disease had not been described before his time, accounts for the fact by the local nature of its outbreaks, the infrequency of its attacks, its prevalence among children who are unable to give an account of their complaints, and the rapidity of its course and the apparent *easiness*, as the author terms it, of the symptoms. Croup, he says, happened, or at least was observed, very seldom in Edinburgh, but he himself, by putting his mind in the way of intelligence, had an opportunity of attending several cases, especially upon the coast of Scotland. He was struck by the danger of the symptoms, under apparent *ease* ; by which expression Dr. Home evidently means that the indications presented were not apparently of an alarming nature ; and the singularity of the post-mortem conditions excited his curiosity. He laments his inability to point out a certain cure, and he excuses his shortcomings as to the description of the entire features of the malady on the pleas of the rarity of its occurrence, and of his own previous inexperience of its visitations. He thought that the croup was local in its attacks, and that it was seldom found at any great distance from the sea-shore. Notwithstanding Dr. Home's reputation as a physician, and his evident anxiety to collect together the history of all the cases possible, he gives only twelve instances of the disease, and of these the first three are rather doubtful as really being cases of croup, and the last four were communicated to him by brother practitioners. The circumstances just alluded to seem to confirm the opinion that the disease was comparatively rare. But the five fatal cases attended by Dr. Home himself leave no doubt as to the

nature of the disease he was describing, and the evidence as to the other four fatal cases attended by other practitioners is equally clear. It is distinctly shown that in all the fatal cases there was a false membrane lining the trachea, and, in some of the patients, portions of membrane were voided by the mouth during life.

In his corollaries, as he terms them, deduced from his own observations and those of others, Dr. Home distinctly specifies the insidious nature of the symptoms, so that, as he says, patients will sometimes eat a minute before they expire; he describes the frequent pulse, strong at first, but afterwards soft and weak; the short and stifled cough, which is sometimes absent. He places the seat of the disease in the wind-pipe, and he describes the tubular false membrane which is there formed; he also considers it impossible to remove it by any internal or external medicine. No means therefore exist to save the patient's life except the extraction of the false membrane, and as this cannot be done through the glottis, he suggests the operation of what he terms *bronchotomy* for that purpose, but he gives no instance in which this operation had been performed, and indeed he proposes that it should be first tried on a dead subject.

In Dr. Home's fatal cases all the appearances of diphtheria are described, except the peculiar exudation on the fauces, and I am inclined to believe that this appearance was not described only because it was not looked for. That characteristic features of a disease which are actually pathognomonic may remain undetected until some sagacious observer points them out is unquestionable; and I can adduce no better example in illustration of this remark than the peculiar rose-rash which indicates the presence of typhoid or enteric fever. In many of the older works on fever, that form of the disease which is distinguished by purging during life, and the discovery of inflamed and ulcerated intestinal glands after death, is most distinctly described, but not one word is said of the rose-rash, which we now know as pointing out most clearly the existence of the lesion of the glands of the ileum. I have now before me Dr. Southwood Smith's *Treatise on Fever*, published in 1830, and in one part of the volume a series of reports is given of the causes of fatal fever occurring in the Fever Hospital, of which, as is well known, Dr. Smith was for many years one of the physicians. The symptoms and the post-mortem appearances of typhoid or enteric fever (although Dr. Smith does not employ those expressions) are fully given under the head of "Cases illus-

trating the morbid changes taking place within the abdomen ; " but it is remarkable that no mention is made of the rose-rash, which must have existed during life, but which was then probably thought to be undeserving of special mention.

Dr. Cullen calls croup *cynanche trachealis*, and describes it as an inflammation of the glottis, larynx, or upper part of the trachea. " It may first arise," he says, " in these parts and continue to subsist in them alone, *or it may come to affect these parts from the cynanche tonsillaris or maligna spreading into them.*" The last sentence seems to me to point to diphtheria, which, as is now well known, appears first upon the tonsils and fauces. Cullen regards croup as an inflammatory affection, and it must be remembered that Bretonneau held the same opinion in reference to *diphthérite.*

Dr. Cullen goes on to say that " in either way it has been a rare occurrence, *and few instances of it have been marked and recorded by physicians.*" This remark also applies to diphtheria, which although occurring at intervals as a dangerous epidemic, cannot be said to be a frequent disease even in the present day.

Dr. Cullen then goes on to detail the symptoms of the disease, as described by Dr. Home, and among many other circumstances he states that, " If anything be spit up, it is a matter of a purulent appearance, *and sometimes films resembling portions of a membrane,*" another characteristic feature of tracheal diphtheria ; and he also says, " When the internal fauces are viewed, they are sometimes without any appearance of inflammation, but frequently a redness and even swelling appear, and sometimes in the fauces *there is an appearance of matter like to that rejected by coughing.* With the symptoms now described, and particularly with great difficulty of breathing, and a sense of strangling in the fauces, the patient is sometimes suddenly taken off." Here there is evidently a reference to the pellicular exudation on the fauces, afterward more particularly described by Bretonneau, Empis, and other still more recent observers ; and the suddenness of the termination is also a marked feature of diphtheria. But the pathological appearances found after death are still more distinctly described by Dr. Cullen. " Almost constantly," he says, " there has appeared a *preternatural membrane* lining the whole internal surface of the upper part of the trachea, and extending in the same manner downward into some of its ramifications. This preternatural membrane may be easily separated, and sometimes has been found separated in

part, from the subjacent proper membrane of the trachea. This last is commonly found entire, that is, without any appearance of erosion or ulceration, &c." I ask whether a more distinct description of the appearances found after death in tracheal diphtheria can be found in any recent volume of the Transactions of the Pathological Society, than this which I have just quoted from the *First Lines* of Dr. Cullen, published at the end of the last century? The next passage I quote in order to show still further that Cullen really described tracheal diphtheria in his cynanche trachealis, and although I think that his theory of the inflammatory nature of the disease is incorrect, it must be remembered that the non-inflammatory character of diphtheria has only lately been entertained. "From the remote causes of this disease," says Cullen; "from the catarrhal symptoms commonly attending it; from the pyrexia constantly present with it; from the same kind of *preternatural membrane* being found in the trachea, when the cynanche maligna is communicated to it; and from the vestiges of inflammation on the trachea discovered upon dissection, we must conclude that the disease consists of an inflammatory affection of the mucous membrane of the larynx and trachea, *producing an exudation analogous to that found on the surface of inflamed viscera*, and appearing partly in a membranous crust, and partly in a fluid resembling pus. When the disease terminates in health, it is by a resolution of the inflammation, by a ceasing of the spasm of the glottis, by an expectoration of the matter exuding from the trachea *and of the crusts formed there*; and frequently it ends without any expectoration, or at least, with such only as attends an ordinary catarrh. When the disease ends fatally, it is by suffocation, seemingly, as we have said, depending upon a spasm affecting the glottis; but sometimes probably depending upon a quantity of matter filling the bronchiæ."

Now in reference to the views I entertain of the identity of tracheal and laryngeal diphtheria with croup, I venture to point out that Dr. Cullen, in the above passages, (which include nearly his whole article on croup,) has exactly described the features of tracheal and laryngeal diphtheria in the present day, although his theoretical views on the subject are certainly not in accordance with those now entertained. Excluding, therefore, his opinions as to the inflammatory character of the affection, we find that the *facts* he adduces are: the rare occurrence of the disease; the death caused frequently by suffocation; the expectoration of films

resembling portions of a membrane; the frequent redness and swelling of the fauces, and the appearance on them of matter (*i. e.* portions of a membrane) like that rejected by coughing; the presence, discovered after death, of a preternatural membrano lining the trachea and extending to the bronchi; and the resemblance of this membrane to that found on the surface of inflamed viscera, as for instance, the pleura and the peritoneum. It must be recollected that the essential features of diphtheria as now known and described are, the first appearance of a membranous exudation on the fauces; the extension of the disease, in fatal cases, to the larynx and trachea; and the presence of a tubular false membrane in the trachea, and sometimes in the bronchi. The patients who recover from laryngo-tracheal diphtheria either throw out the pellicular exudation by coughing or vomiting, or the false membrane is removed by the operation of tracheotomy; in those who die, a false membrane is found lining the trachea.

Dr. Home and Cullen wrote upon croup and cynanche trachealis (which words are exactly synonymous, for Home's croup is Cullen's cynanche trachealis) toward the end of the last century, and Bretonneau's first observations on *diphthérite* were made in the year 1818, at Tours in France. The great peculiarity, or I should say, the merit, of Bretonneau's observations, was the determination of the presence of a false membrane on the fauces as the necessary and almost constant pathological feature of the disease now described. Home appears to have omitted to look for the pellicular exudation on the fauces, and therefore does not describe it; Cullen states that croup (cynanche trachealis) may affect the larynx and trachea from an extension into those parts of the *cynanche tonsillaris* or *maligna*, and that in the fauces there sometimes appears a matter like that rejected by coughing, namely, films resembling portions of a membrane. But Bretonneau pointed out that the pellicular exudation on the fauces was an *essential character* of the disease, and among all his cases he saw only a single patient who did not present plastic exudations at the back of the throat. He therefore considered the presence of the false membrane as pathognomonic of the disease which had been described by Home and Cullen in Scotland, and which he himself had observed in Tours, and he proposed the name of *Diphthérite*, which name has, with some modification, (Diphtheria,) been since employed.

The croup of Home and Cullen was, as I have shown, a comparatively rare disease, and appears to have occurred in a sporadic

form in certain parts of the east coast of Scotland; and the *diphthérite* of Bretonneau occurred in a similarly sporadic form in various parts of France. All attempts to connect the origin or spread of the disease with local peculiarities of soil or situation have hitherto failed, and although Home supposed that the vicinity of the sea, and the prevalence of the east wind, might explain the outbreak of the Scotch epidemic, it is quite evident, from all subsequent observations, that any parts of a country are equally liable to become the scenes of the sporadic attacks. Elevation and dryness of soil, depression and moisture, vicinity of rivers, climate and season, are alike inadequate to explain the outbreaks of this mysterious disease, which fitfully appears in some spot, (perhaps apparently an isolated one,) commits dreadful havoc among a few families, and then disappears for a longer or shorter period, leaving the most acute observers in doubt as to the explanation of its advent or its decline.

Now it appears to me that writers on the Practice of Medicine in recent years, by putting together the throat-affections described by Home, Cullen, and Bretonneau, and by adding to them the descriptions of laryngeal and tracheal inflammation given by a multitude of other observers, have confounded two diseases, which I maintain to be in their essence and nature, wholly distinct, although it is true the throat is affected in both. Dr. Aitken, in his *Science and Practice of Medicine*, article "Croup," seems to recognise this distinction, for he says that "there are two forms of croup, which can easily be distinguished from each other, but which are often confounded." One form, he says, is very manageable, the other is very fatal. In the first variety the mucous membrane chiefly secretes mucus, pus, or mucopurulent fluid. In the second and more dangerous form an *albuminous or fibrinous exudation* grows upon the inner surface of the air-passages, constituting the false membrane. The first form seems to be the one common in America, of which not more than *one* case in *fifty* dies. The second is the more common European form, of which the deaths used to be *four* out of *five*, and still are about *a half*." Dr. Aitken, therefore, takes the same view of the question as I do; but I proceed somewhat further, and propose to abolish the word Croup altogether as a nosological term, and to substitute, for the one name under which the two affections have hitherto been confounded, two others which really convey a pathological significance: namely, *Laryngo-tracheal Diphtheria*, in which there *is* a false membrane, and *Laryngitis Stridulosa*, in which there is none.

The first is the very fatal disease alluded to by Dr. Aitken, and the second is the "very manageable one" of the same paragraph by that author.

Guersant, in his article on Croup,* which disease he designates as synonymous with the *tracheal diphthérite* of Bretonneau, clearly points out the distinction between the two diseases. "We find," he says, "that the diseases generally designated under the name of Croup present themselves, in relation to their anatomical characters, under two principal, but very different aspects; either the internal surface of the pharynx, and consequently that of the larynx, the trachea, and the bronchi, is covered with membranous or pseudo-membranous exudations, which are easily perceived on all the parts within the reach of sight, and which the expectoration afterward contains; or all these parts are simply reddened, or very slightly swollen, as in slight cases of pharyngeal and laryngeal angina, and then no plastic exudation is discovered." Guersant, in accordance with the French views, considers both these affections as inflammatory, and calls the first membranous or pseudo-membranous pharyngo-laryngitis, and the second stridulous laryngitis.

The doctrines taught in the schools of medicine in this country, and carried out in practice in recent years in reference to (1) the inflammatory and (2) the pseudo-membranous affections of the larynx and trachea, were founded upon the supposition that inflammations of the mucous membrane of these organs were almost necessarily attended by the formation of a false membrane, which choked the patient, and was the cause of death; and that, therefore, the most energetic means were to be adopted to prevent the formation of this false membrane, or to cause its absorption if it had been formed. For this purpose bleeding was recommended in order to subdue the inflammation, and calomel was also recommended for the purpose of removing or absorbing the membranous exudation. I candidly admit that, having been taught these doctrines myself, my practice was guided by them for many years, but I now believe that they are erroneous. My views of croup were based upon the instructions I received at the medical school where I was educated, and upon the article "Croup" in Dr. Copland's Dictionary; and, if I am not mistaken, that article (a very able one) formed the text for most of the essays and writings subsequently

* *Dictionnaire de Médecine*, 1835.

published on the same subject. But, as I have previously observed, Dr. Copland (excluding laryngismus stridulus) evidently confounded two other diseases together. He was well acquainted with the literature of the subject, and finding that Home, Cullen, Bretonneau, and others, particularly described a false membrane in the same disease, which they respectively called croup, cynanche trachealis, and diphthérite, and knowing also from his own experience and that of his contemporaries that an inflammatory disease of the larynx and wind-pipe was very common in children, he put together the two diseases into one, and hence the confusion which now exists. For I look in vain through Dr. Copland's article for any cases, *from his own experience,* in which the inflammatory symptoms were attended or followed by the formation of a false membrane, and I doubt whether that distinguished physician had seen or treated many cases of diphtheria. Those who are familiar with these affections in the present day will, I think, readily admit that laryngo-tracheal diphtheria is not preceded by inflammatory symptoms; and that, on the other hand, the inflammatory affection (or laryngitis stridulosa) is not followed by the formation of false membrane. But by adding together the features of the inflammatory affection which is indigenous among us, (and which indeed is never absent,) and those of the sporadic disease, which occurs only at intervals, an imaginary picture—like that of the centaur, made up of a man and a horse, or of the mermaid, made up of a woman and a fish—has been obtained, and has received and still retains the name of Croup. If practitioners acted on this erroneous notion, they would probably continue to prescribe calomel for the solution of a false membrane which never existed, or, still worse, perform tracheotomy for the removal of an imaginary obstacle to the respiration; while, on the other hand, they would combat diphtheria with powerful anti-phlogistic remedies which would only accelerate a fatal result.

In a previous essay I have pointed out the distinctions existing between (1) the laryngitis stridulosa, which is a very common inflammatory affection in this country, and is popularly called croup, and (2) tracheal diphtheria, which is not a very common disease, and is not inflammatory. The first is not characterized by the formation of a false membrane, and the second invariably is: in fact, *the false membrane is the pathognomonic feature of diphtheria.*

During an experience of several years, rendered somewhat more extensive of late by my special attention being devoted to the subject, I have seen many cases of laryngo-tracheal diphtheria, and many

more of laryngitis stridulosa, but I have failed to find any cases which, while presenting the strongly marked inflammatory and febrile characters of the latter, have also exhibited the false membranes of the former. I am induced, therefore, to believe that the laryngitis stridulosa, although it may be, and probably is, sometimes fatal, does not prove so by the devlopment of a false membrane; and that, on the other hand, tracheal diphtheria is not an inflammatory disease at all, but that the false membrane is the result of the operation of some peculiar endemic, epidemic, or even perhaps contagious poison, on certain portions of the mucous membrane. Laryngitis stridulosa, which is not necessarily fatal, may kill the patient, as bronchitis or pneumonia may do, by the general inflammatory action: diphtheria, which is almost necessarily fatal when it attacks the larynx or trachea, kills by suffocation or by the action of a specific poison on the nervous system. I say that diphtheria is almost necessarily fatal when it attacks the larynx or trachea, the exceptions being found in the cases where the false membrane is thrown up by expectoration, or is removed by surgical operation. The successful cases of diphtheria are usually those which are confined to the fauces or upper part of the glottis, or other more or less external parts, and in which the interior of the larynx and trachea is not attacked.

The evidence of statistics in determining the question of the pathology or the relative frequency of diphtheria and croup, I do not regard as of much value. I am aware that the returns of the Registrar-General will give so many cases of Croup, and so many cases of Diphtheria, as occurring in given periods at stated times, but in the absence of post-mortem examinations, carefully made and recorded, the pathological bearing of such returns is of no value. Scores of children die of laryngitis, tracheitis, bronchitis, and pneumonia, strumous or otherwise, and if they have had what is called a "croupy cough," the deaths are probably registered as Croup; and, on the other hand, besides the actual deaths from Diphtheria, there is no doubt that many cases of aphthæ, muguet, malignant ulceration of the throat, and even scarlatina, are comprehended in the returns under that term, familiar as it has now become in the public mind.

But on turning to the records of the Pathological Society, the evidence there given becomes really valuable, because in that Society nothing is believed on hearsay, and the specimens are seen and examined by competent observers, and the history of each case, during life and after death, is related by the reporter. Now, in

examining the volumes of the Pathological Society's Transactions, I cannot find any account of false membranes in the larynx or trachea preceded by those inflammatory symptoms which we are told to look for in systematic books treating on the disease called croup. Some of these cases (*i. e.* of false membrane in the larynx and trachea) presented to the Pathological Society, were contributed by myself, and they were certainly not preceded by acute inflammatory symptoms. Before the year 1859, the word Diphtheria is of course not to be found in the index of the Pathological Society's Transactions, but since that year it appears pretty frequently; and what is remarkable, as bearing upon the views I am now advancing, the word Croup then appears but seldom. In fact, in proportion as Diphtheria appears in the Transactions, Croup disappears, showing that the old croup is the modern (tracheal) diphtheria.

On examining the cases of so-called croup in the Transactions, they are all really cases of diphtheria, except one, and in that there was no false membrane. As an instance of the more correct views which are now beginning to be entertained as to the pathology of diphtheria, I may adduce from volume XXI of the Transactions a case headed, "Specimen Illustrating a Case of Croup." I cannot transcribe the whole of this case from want of space, but the chief features were that the patient, a man aged forty-three, was seized with hoarseness, and "was somewhat feverish, *but not very so.*" "*He threw up a cast,*" exhibited afterward to the Society. He was naturally pale and dingy in complexion, but, had it not been for his painfully difficult respiration, "he would not have appeared ill;" when he was visited, "he was lying in a comfortable semi-supine position." I have quoted the exact words of the reporter, and I ask, How do such symptoms represent the inflammatory and febrile disturbance which is said in medical books to characterize croup? The rest of the report of the case shows that the false membrane lined the whole of the trachea, and this false membrane, together with that thrown up during life, was exhibited to the Society. The gentleman who reports the case, however, strongly insists upon its being one of croup, "if ever," he says, "there is such a disease as croup *per se.*" Notwithstanding this strongly expressed opinion on his part, I am not astonished to find, in a note appended to the report, that "there was an opinion generally expressed," at the meeting at which the specimen was shown, to the effect "that the disease corresponded with what is ordinarily described as diphtheria."

The member of the Pathological Society, whose case is now

referred to, says that it is one of croup, "if there is such a disease as croup *per se*." His case is clearly one of *diphtheria*, and so it was properly regarded by the members of the Society when it was related, and when the specimen was exhibited; and it may be remarked that there is really no such disease as croup *per se*, but that the word, as popularly used, comprises two different affections, namely tracheal (or laryngo-tracheal) diphtheria, where there is a false membrane, and laryngitis stridulosa, where there is none.

The distinction thus drawn is not a merely theoretical one, founded upon speculative views of pathology, but is most important in relation to practice. Laryngitis stridulosa is very properly treated by antiphlogistic remedies, by a spare diet, and by depressing expectorants, including tartarized antimony; but diphtheria requires essentially a supporting method of treatment, including wine, and local applications to the uvula and tonsils and soft palate, to alter the condition of the mucous membrane, to support the strength, and to prevent the spread of the pellicular exudation. In diphtheria, the expulsion of the false membrane from the larynx or trachea (if the disease has extended there) is essential to the cure; in laryngitis stridulosa, there is no false membrane to expel.

Tracheotomy in tracheal diphtheria is employed in order to remove the false membrane, but the operation is useless or mischievous in laryngitis stridulosa, or when the windpipe is merely clogged by mucus, or the mucous membrane is simply inflamed. In making this statement I by no means assert that tracheotomy is useful *only* in tracheal diphtheria, for it is absolutely essential and often successful in some cases of occlusion of the glottis, in syphilitic and other growths obstructing the rima glottidis, in œdema of the same part, &c., but the question of tracheotomy in such affections has no relation to my present subject.

In conclusion, I briefly adduce a case occurring in my own family, as illustrating the views I have just advanced; and as my observations involve a confession of my own pathological error, formerly entertained, they are at least sincere. One of my daughters, when a child of two years old, was seized, in the middle of the night, with what I then considered as decided symptoms of croup, and she was immediately and successfully treated by antiphlogistic measures, including leeches, calomel, and tartar emetic. My opinion then was that these remedies had prevented the formation of the false membrane, or had caused its absorption if it were formed. I am now convinced that, although the treatment was quite correct,

no false membrane was, or would have been, formed. The case was one of laryngitis stridulosa, in which no false membrane is ever formed. I have seen many such cases since, and I have treated them in a similar, though perhaps not in quite so active a manner, and generally with success; but laryngo-tracheal diphtheria is a totally different affection, and the same treatment would accelerate, if it did not cause, a fatal result.

The propositions advanced in this communication, when arranged in a logical form, are the following. "CROUP" is a barbarous Scotch word, with no etymological meaning whatever, but it was used by Francis Home to designate a disease the features of which he distinctly described. That disease was undoubtedly the same as the *cynanche trachealis* of Cullen, the *tracheal diphthérite* of Bretonneau, and the *tracheal diphtheria* of the present day. Therefore the croup of Home, the cynanche trachealis of Cullen, the tracheal diphthérite of Bretonneau, and the tracheal diphtheria of the present day, are one and the same disease. If croup is tracheal diphtheria, then croup is a form of diphtheria. If the populace employ the word Croup in a loose way to designate any form of suffocative cough attended with stridulous inspiration, the circumstance is of no pathological importance, any more than the habit of applying the term Asthma to all kinds of difficulty of breathing, whether caused by disease of the heart or lungs, or whether it be organic, inflammatory, or spasmodic. The inflammatory disease of the larynx and windpipe, which is often popularly called Croup, but is not attended by the formation of a false membrane, and is therefore not the croup of Home and Cullen and Bretonneau, is *not* a form of diphtheria; its proper name is Laryngitis Stridulosa.

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